PB84-104546

Final Report on the Study of Diesel Particulate Traps at Low Mileage

(U.S.) Environmental Protection Agency
Ann Arbor, MI

Aug 83

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Several approaches to the control of Diesel particulate emissions are being pursued by the automotive industy, EPA, and others. These include operating mode modifications, engine design and component modifications, fuel modifications, and exhaust treatment devices. This report summarizes the results of a recently completed, inhouse study which began in May, 1979. The purpose of this study was to evaluate the low mileage performance of Diesel exhaust particulate traps. Extended durability of the most promising traps would be evaluated in another program at Southwest Research Institute.

KEYWORDS: *Particles, *Exhaust emissions, *Air pollution, *Diesel engine exhaust.

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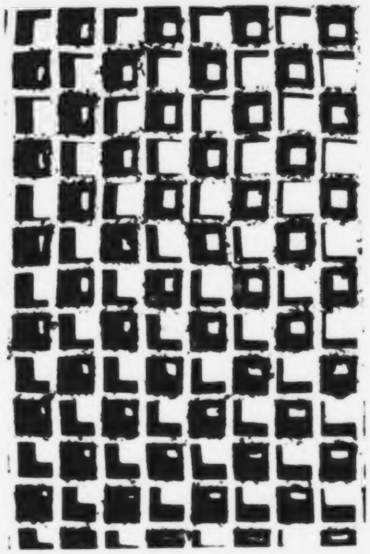
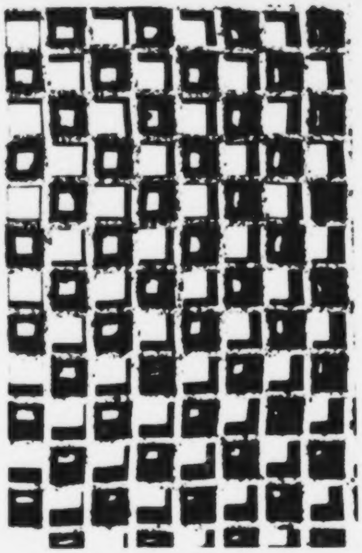


by

Larry C. Landman
Robert D. Wagner

August, 1983



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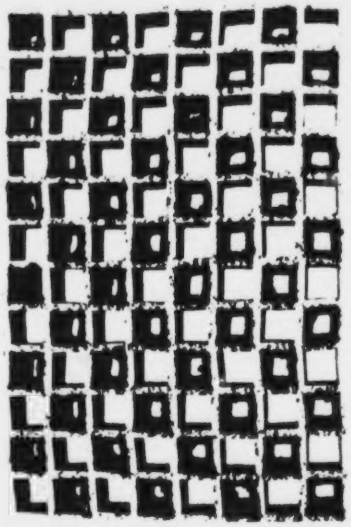

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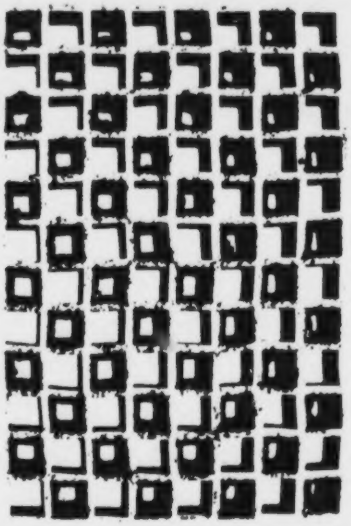

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Cover Photograph: Enlargement of a Corning ceramic monolith trap showing the particulate accumulation.

Background

Diesel engines have become available in passenger car service because of their good fuel economy in comparison to cars equipped with conventional (gasoline fueled) engines. Although the exhaust of vehicles equipped with Diesel engines is relatively clean with respect to unburned hydrocarbons (HC) and carbon monoxide (CO), it contains total particulate emissions (TP) that are 30 to 50 times greater than those produced by vehicles equipped with conventional catalyst equipped engines.

Several approaches to the control of Diesel particulate emissions are being pursued by the automotive industry, EPA, and others. These include operating mode modifications, engine design and component modifications, fuel modifications, and exhaust treatment devices.(1)*

This report summarizes the results of a recently completed, inhouse study which began in May, 1979. The purpose of this study was to evaluate the low mileage performance of Diesel exhaust particulate traps. Extended durability of the most promising traps would be evaluated in another program at Southwest Research Institute.(2)

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*Numbers in parentheses designate References at the end of this paper

Conclusions

1. Durability data are conspicuously lacking for most of these traps. However, we shipped the NGK #1 trap (which has shown good regenerative capabilities and trapping efficiencies in excess of 60%) to Southwest Research Institute, an EPA contractor, to conduct such durability testing. Also, SwRI has durability tested a Corning EX-47, 12 inch, non-catalyzed trap and accumulated 50,000 miles on it (2). We selected these two traps for high mileage testing after evaluating their performance in this low mileage program.

2. The regeneration procedure used in-house (for most traps) was to run the vehicle at 60 mph for 8 minutes throttled and then for 4 minutes unthrottled. This regeneration procedure is an adequate technique for regenerating traps under laboratory conditions; however, it might not be practical in everyday driving. Other methods have been reported; for example, the methods used by Johnson Matthey (i.e., limited throttling and high EGR (3)) and by Ford (i.e., using an externally fueled burner (4,5)).

   Several catalyzed traps were able to regenerate on the Highway Cycle and thus may not require a special regeneration cycle.

3. Sulfate emissions, especially on the Highway Cycle, were increased with some catalyzed traps.

4. CO emissions were higher on the regeneration cycle than on either the FTP or Highway Cycles due possibly to the increase in the fuel/air ratio associated with the regeneration methods which were used and to incomplete oxidation of the carbon particles in the trap.

5. None of the traps tested in this program suffered a "melt down" due to high temperatures. However, the Corning/UOP cracked, an NGK was worn down on the end, and the Texaco A-1R separated.

6. The traps which were successfully regenerated all displayed an oscillatory nature in their Total Particulate (TP) emissions and Exhaust Gas Back Pressure (EGBP) when these parameters were examined versus odometer mileage.

7. The fuel economy data were mixed. Of the traps tested at low mileage, the average decrease in fuel economy was 1.8 percent on the FTP and 1.0 percent on the Highway Cycle. However, about one-third of the traps were associated with slight increases (about 2%) in fuel economy on both the FTP and Highway Cycles.

Summary

A summary of the test results for the traps follows in Tables 1, 2, and 3 for Axial Flow, Radial Flow, and Through-the-Wall Flow traps, respectively.

The possibility that the trap-oxidizer might adversely affect fuel economy has been of some concern.(6) To examine this possibility, graphs of fuel economy, trapping efficiency, and EGBP versus mileage accumulation were plotted. (See Appendix D.) These graphs indicate that there is a tendency for a loss of fuel economy as EGBP increases; however, the data (Appendix A) indicate that the overall (i.e., harmonic mean) fuel economy with the trap is not significantly different from the fuel economy without the trap.

TABLE 1

Summary of Test Results for Each Axial Flow Trap

Trap	Catalyzed ?	Substrate	Regen. Dist*	Trapping Efficiencies (%) FTP	Trapping Efficiencies (%) HWFE
Texaco A-1R	No	'Carpenter 20' mesh	N.S.	47.9	52.6
Texaco A-1R CST-1 coating	Yes	'Carpenter 20' mesh	HWFE	41.1	-163.6
Texaco A-1R CST-1 coating #2	Yes	'Carpenter 20' mesh	HWFE	49.5 4.3	-150.4 (1) -101.4 (2)
W.R. Grace U13U13 U25U25U30U30	No	Ceramic Foam	N.A.	80.6	N.A.
W.R. Grace U13U13 w 8" spacer	No	Ceramic Foam	N.A.	48.2	53.2
W.R. Grace U25U25 w 8" spacer	No	Ceramic Foam	N.A.	61.9	63.4
W.R. Grace CA13CA13 w 8" spacer	Yes	Ceramic Foam	N.A.	64.0	N.A.
Toyota Foam	No	Ceramic Foam	539 Mi [2 reg]	32.6	29.5
Bridgestone #1	No	Ceramic Foam	N.A.	(3)	(3)
Bridgestone #1-2	No	Ceramic Foam	140 Mi [6 reg]	68.3	76.1
Bridgestone BS2- 1	No	Ceramic Foam	225 Mi [4 reg]	53.3	57.8
Bridgestone - Cat	Yes	Ceramic Foam	112 Mi [2 reg]	71.9	73.8
Bridgestone - Cat #2	Yes	Ceramic Foam	209 Mi [4 reg]	71.1	76.7

---

* Regen. Dist The average interval between regenerations.
N.S. Regneration was attempted, but was Not Successful.
HWFE Trap was regenerated on the HWFE driving cycle.
N.A. Regeneration was Not Attempted.

(1) Low Mileage
(2) High Mileage
(3) Exhaust Leak

TABLE 1 (con't)

Summary of Test Results for Each Axial Flow Trap

	Percent Reduction (4)						
Test Cycle	HC	CO	NOx	TP	F.E.		Test Vehicle
FTP	50.8%	0.2%	-2.4%	47.9%	2.7%		Mercedes
HWFE	38.8%	-4.5%	-7.8%	52.6%	1.4%		
FTP	88.4%	96.2%	1.9%	41.1%	-1.0%		Mercedes
HWFE	89.4%	99.98%	4.5%	-163.6%	-6.6%		
FTP	93.9%	98.4%	1.1%	49.5%	-3.8%	(1)	Mercedes
HWFE	11.1%	99.8%	1.3%	-150.4%	-1.9%	(1)	
FTP	-132.9%	79.4%	-1.2%	4.3%	8.3%	(2)	
HWFE	-54.6%	100.0%	-0.8%	-101.4%	3.5%	(2)	
FTP	29.8%	1.5%	-10.4%	80.6%	10.4%		Toyota
HWFE	---	---	---	---	---		
FTP	23.7%	3.6%	-6.4%	48.2%	3.7%		Toyota
HWFE	19.1%	-5.0%	-5.4%	53.2%	4.6%		
FTP	25.5%	1.6%	-8.7%	61.9%	5.8%		Toyota
HWFE	19.7%	-15.7%	-10.0%	63.4%	7.1%		
FTP	74.9%	58.0%	-6.6%	64.0%	6.9%		Toyota
HWFE	---	---	---	---	---		
FTP	14.4%	-6.7%	-6.5%	32.6%	3.9%		Toyota
HWFE	11.2%	-29.3%	-8.7%	29.5%	3.5%		
FTP	(3)	(3)	(3)	(3)	(3)		Toyota
HWFE	(3)	(3)	(3)	(3)	(3)		
FTP	28.3%	-0.6%	-7.3%	68.3%	2.2%		Toyota
HWFE	31.4%	-10.7%	-4.5%	76.1%	3.4%		
FTP	24.1%	-1.0%	-4.4%	53.3%	-0.8%		Toyota
HWFE	15.6%	-8.2%	-2.3%	57.8%	-1.0%		
FTP	23.7%	-3.7%	-2.3%	71.9%	0.4%		Toyota
HWFE	28.8%	-9.1%	4.7%	73.8%	-2.0%		
FTP	33.6%	-1.5%	0.3%	71.1%	0.3%		Toyota
HWFE	45.8%	-5.9%	4.2%	76.7%	-0.3%		

---

(4) A negative reduction indicates an increase in that specific quantity.

TABLE 2

Summary of Test Results for Each Radial Flow Trap

Trap Description	Catalyzed ?	Test Substrate	Test Vehicle	Regen. Dist*	Trapping Efficiencies (%)	
					FTP	HWFE
Balston filter (disposable trap)	No	Fibrous material	Mercedes	N.A.	89.9	40.3
Johnson Matthey JM-4 #1	Yes	'309 Stainless' mesh	Peugeot	HWFE	2.8	-307.0
Johnson Matthey JM-4 #2	Yes	'309 Stainless' mesh	Peugeot	HWFE	35.9 -42.3	-296.7 (1) -623.0 (2)
Johnson Matthey JM-13	Yes	'304 Stainless' mesh	VW	125 Mi [20 reg]	79.9	40.5
ICI Saffil	Yes	Mesh of alumina 'Saffil' fibers	Mercedes	450 Mi [3 reg]	20.7	17.8
ICI Saffil #4	Yes	Mesh of alumina 'Saffil' fibers	Mercedes	N.A.	-49.4	10.2
			Toyota	N.A.	27.8	42.1

---

* Regen. Dist The average interval between regenerations.
N.S. Regneration was attempted, but was Not Successful.
HWFE Trap was regenerated on the HWFE driving cycle.
N.A. Regeneration was Not Attempted.

(1) Low Mileage
(2) High Mileage

TABLE 2 (con't)

Summary of Test Results for Each Radial Flow Trap

	Percent Reduction (3)				
Test Cycle	HC	CO	NOx	TP	F.E.
FTP	15.0%	1.8%	-8.5%	89.9%	5.6%
HWFE	16.8%	1.9%	-4.3%	40.3%	4.0%
FTP	91.3%	94.7%	3.2%	2.8%	5.0%
HWFE	75.8%	100.0%	1.8%	-307.0%	-0.2%
FTP	89.6%	90.2%	10.0%	35.9%	-0.3% (1)
HWFE	65.4%	98.6%	4.1%	-296.7%	-1.9% (1)
FTP	40.3%	77.4%	12.5%	-42.3%	10.7% (2)
HWFE	64.6%	100.0%	13.1%	-623.0%	4.0% (2)
FTP	79.2%	81.3%	-1.2%	79.9%	5.1%
HWFE	96.1%	99.7%	1.4%	40.5%	5.4%
FTP	5.0%	7.7%	4.0%	20.7%	-0.3%
HWFE	13.9%	1.7%	3.6%	17.8%	-0.2%
FTP	-14.0%	-16.0%	-4.8%	-49.4%	4.3%
HWFE	-2.2%	-32.6%	-7.1%	10.2%	4.0%
FTP	17.4%	8.2%	-2.1%	27.8%	-1.7%
HWFE	21.9%	3.4%	-0.2%	42.1%	0.4%

---

(3) A negative reduction indicates an increase in that specific quantity.

TABLE 3

Summary of Test Results for Each Through-the-Wall Trap

Trap	Catalyzed ?	Test Substrate	Regen. Dist*	Trapping Efficiencies (%) FTP	HWFE
Corning EX-40 6" non-catalyzed	No	Ceramic Monolith	N.A.	83.9	79.0
Corning EX-47 6" non-catalyzed	No	Ceramic Monolith	N.A.	68.5	63.6
Corning EX-47 6" with CST-1 Coating	Yes	Ceramic Monolith	N.S.	74.6	-12.2
Corning EX-47 12" Uncatalyzed (#1)	No	Ceramic Monolith	330 Mi [2 reg]	64.1	63.8
Corning EX-47 12" with UOP Coating	Yes	Ceramic Monolith	161 Mi [2 reg]	40.5	-66.6
Corning EX-47 12" Uncatalyzed (#2)	No	Ceramic Monolith	173 Mi [2 reg]	83.4	85.5
NGK #1	No	Ceramic Monolith	479 Mi [3 reg]	62.6	75.8
NGK #2	No	Ceramic Monolith	185 Mi [4 reg]	86.8	87.0
NGK #3	No	Ceramic Monolith	179 Mi [4 reg]	43.5	51.3 (1)
NGK #4-1	No	Ceramic Monolith	167 Mi [4 reg]	88.5	83.7
NGK #4-2	No	Ceramic Monolith	210 Mi [2 reg]	85.4	86.8

---

*
N.S. Regneration was attempted, but was Not Successful.
HWFE Trap was regenerated on the HWFE driving cycle.
N.A. Regeneration was Not Attempted.

(1) Between 1st and 4th Regen.

TABLE 3 (con't)

Summary of Test Results for Each Through-the-Wall Trap

Test Cycle	Percent Reduction (2)					Test Vehicle
	HC	CO	NOx	TP	F.E.	
FTP	45.4%	15.8%	2.7%	83.9%	-5.5%	Mercedes
HWFE	24.1%	18.0%	6.9%	79.0%	-7.6%	
FTP	27.0%	2.4%	-11.4%	68.5%	6.2%	Mercedes
HWFE	28.3%	7.1%	-10.0%	63.6%	7.8%	
FTP	63.2%	61.1%	-3.5%	74.6%	1.4%	Mercedes
HWFE	73.7%	95.0%	-5.9%	-12.2%	4.8%	
FTP	13.6%	-3.8%	4.6%	64.1%	-4.0%	Mercedes
HWFE	1.3%	-25.0%	-0.8%	63.8%	1.2%	
FTP	63.6%	72.8%	3.0%	40.5%	-0.1%	Mercedes
HWFE	85.6%	93.4%	0.2%	-66.6%	0.5%	
FTP	41.7%	-4.1%	-1.9%	83.4%	1.5%	Mercedes
HWFE	10.0%	1.7%	1.0%	85.5%	-0.9%	
FTP	22.7%	4.4%	-0.2%	62.6%	0.1%	Toyota
HWFE	27.8%	-2.4%	-2.7%	75.8%	1.3%	
FTP	38.1%	4.3%	1.1%	86.8%	-0.2%	Mercedes
HWFE	50.4%	13.8%	-0.3%	87.0%	-0.4%	
FTP	27.1%	-6.8%	-3.2%	43.5%	2.3%	Mercedes
HWFE	13.8%	1.4%	2.5%	51.3%	-1.5%	
FTP	16.1%	3.3%	1.6%	88.5%	1.5%	Mercedes
HWFE	19.6%	1.4%	0.8%	83.7%	0.7%	
FTP	25.6%	-0.6%	-0.7%	85.4%	3.1%	Mercedes
HWFE	33.7%	-2.9%	-3.5%	86.8%	3.5%	

---

(2): A negative reduction indicates an increase in that specific quantity.

Test Program

Thirty particulate traps were tested in this program. Four production passenger cars were used. The test vehicles which were used are a 1975 model year Mercedes Benz 300D, a 1978 model year Peugeot 504 Diesel, a 1981 model year Toyota Crown Super-Deluxe Diesel, and a 1982 model year Volkswagen Rabbit. The Toyota is not currently certified for sale in the USA. It was loaned to EPA for this test program. A complete description of these vehicles can be found in Tables 4 through 7 respectively. A listing of the traps can be found in Table 8.

Testing of a given trap was usually terminated for one of the following reasons:

1. Trapping efficiency less than 30%,
2. Very high initial exhaust gas backpressure (EGBP),
3. Inability of the trap to be regenerated using throttling,
4. Damage to the trap, or
5. Interest in another trap.

Emission and backpressure data generated in the program can be found in Appendixes A, B, and C. Also, compiled in Appendix F, for comparison, are the emissions data on all certification vehicles, through the 1983 model year, tested at EPA's Motor Vehicle Emission Laboratory for which particulate data were measured.

Table 4

TEST VEHICLE DESCRIPTION

1975 Mercedes Benz 300D

Vehicle Identification Number: 11511412019885

Engine

type	4 Stroke Cycle, IDI Diesel, In-Line 5
bore x stroke	3.58 x 3.64 inches
displacement	3.0 Liter/183 CID
compression ratio	21.0:1
maximum power @ rpm	77 horsepower @ 4000 RPM
fuel metering	Diesel Fuel Injection

Drive Train

transmission type	3-speed automatic

Chassis

type	4 door sedan
tire size	175 SR14
test weight	4000 pounds
dynamometer horsepower	13.2

Table 5

TEST VEHICLE DESCRIPTION

1978 Peugeot Diesel 504

Vehicle Identification Number: 504AC0-2700783

Engine

type	4 Stroke Cycle, IDI Diesel, In-Line 4
bore x stroke	3.7 x 3.26 inches
displacement	141 CID
compression ratio	22.5:1
maximum power @ rpm	71 Horsepower @ 4500 RPM
fuel metering	Diesel Fuel Injection

Drive Train

transmission type	4-speed manual
axle ratio	3.70
N/V	51.4

Chassis

type	4 door sedan
tire size	175 x 14
test weight	3500 pounds
dynamometer horsepower	12.3

Table 6

TEST VEHICLE DESCRIPTION

1981 Toyota Diesel Crown Super Deluxe

Vehicle Identification Number: K-LS110-SEMFSY

Engine	
type	4 Stroke Cycle, IDI Diesel, In-Line 4
bore x stroke	3.54 x 3.39 inches
displacement	2188cc/133.5 CID
compression ratio	21.5:1
maximum power @ rpm	62 horsepower @4200 RPM
fuel metering	Diesel Fuel Injection
Drive Train	
transmission type	5-speed manual
Chassis	
type	4 door sedan
tire size	E78-14B
test weight	3000 pounds
dynamometer horsepower	12.0

Table 7

TEST VEHICLE DESCRIPTION

1982 VW Diesel Rabbit

Vehicle Identification Number: IVWFG0171BV012548

(Also designated '071-612' for Certification testing)

Engine

type	4 Stroke Cycle, IDI Diesel, In-Line 4
bore x stroke	3.01 x 3.40 inches
displacement	1588cc/97 CID
compression ratio	23.0:1
maximum power @ rpm	52 Horsepower @ 4800 RPM
fuel metering	Diesel Fuel Injection

Drive Train

transmission type	4-speed manual
axle ratio	3.89
N/V	41.6

Chassis

type	2 door hatchback
tire size	P155/80R13
test weight	2250 pounds
dynamometer horsepower	6.8

TABLE 8

Summary of Traps Used in In-House Test Program

Trap	Catalyzed	Substrate	Test Vehicle	Dates Tested
Axial Flow Traps:				
Texaco A-1R	No	'Carpenter 20' mesh	Mercedes	5/79 - 6/79
Texaco A-1R with CST-1 coating	Yes	'Carpenter 20' mesh	Mercedes	7/79
Texaco A-1R with CST-1 coating #2	Yes	'Carpenter 20' mesh	Mercedes	10/79 - 1/80
W.R. Grace U13U13U25U25U30U30	No	Ceramic Foam	Toyota	3/82
W.R. Grace U13U13 w 8" spacer	No	Ceramic Foam	Toyota	3/82
W.R. Grace U25U25 w 8" spacer	No	Ceramic Foam	Toyota	3/82
W.R. Grace CA13CA13 w 8" spacer	Yes	Ceramic Foam	Toyota	4/82
Toyota Foam	No	Ceramic Foam	Toyota	4/82 - 8/82
Bridgestone #1	No	Ceramic Foam	Toyota	8/82 - 10/82
Bridgestone #1-2	No	Ceramic Foam	Toyota	10/82 - 12/82
Bridgestone BS2-1 (replaced #1)	No	Ceramic Foam	Toyota	1/83 - 3/83
Bridgestone - Cat	Yes	Ceramic Foam	Toyota	4/83
Bridgestone - Cat #2	Yes	Ceramic Foam	Toyota	5/83 - 6/83
Radial Flow Traps:				
Balston filter (disposable trap)	No	Fibrous material	Mercedes	9/79 - 10/79
Johnson Matthey JM-4 #1	Yes	'309 Stainless' mesh	Peugeot	11/79 - 12/79
Johnson Matthey JM-4 #2	Yes	'309 Stainless' mesh	Peugeot	3/80 - 7/80
Johnson Matthey JM-13	Yes	'304 Stainless' mesh	VW	7/82 - 1/83
ICI Saffil	Yes	Mesh of alumina 'Saffil' fibers	Mercedes	8/79 - 9/79 & 10/79
ICI Saffil Generation #4	Yes	Mesh of alumina 'Saffil' fibers	Mercedes Toyota	10/80 - 4/81 9/81 - 10/81
Through-the-Wall Flow Traps:				
Corning EX-40 6" non-catalyzed	No	Ceramic Monolith	Mercedes	9/79
Corning EX-47 6" non-catalyzed	No	Ceramic Monolith	Mercedes	1/80
Corning EX-47 6" with CST-1 Coating	Yes	Ceramic Monolith	Mercedes	1/80 - 2/80
Corning EX-47 12" Uncatalyzed (#1)	No	Ceramic Monolith	Mercedes	2/80 - 4/80
Corning EX-47 12" with UOP Coating	Yes	Ceramic Monolith	Mercedes	4/81 & 8/81 - 10/81
Corning EX-47 12" Uncatalyzed (#2)	No	Ceramic Monolith	Mercedes	3/82 - 5/82
NGK #1	No	Ceramic Monolith	Toyota	10/81 - 1/82
NGK #2	No	Ceramic Monolith	Mercedes	11/81 - 2/82
NGK #3	No	Ceramic Monolith	Mercedes	5/82 - 8/82
NGK #4-1	No	Ceramic Monolith	Mercedes	8/82 - 10/82
NGK #4-2 (duplicate)	No	Ceramic Monolith	Mercedes	11/82 - 12/82

Preliminary results of Ames tests from vehicles in this program can be found in Appendix G-1. Appendix G-2 contains preliminary Ames results from other EPA test programs and includes data from in-use and certification vehicles.

A summary of these preliminary Ames test data is presented in Appendix G-3. The reader should be cautioned that there may be substantial variability in Ames data. There may be problems in variability resulting from:

1) the samples being extracted at varying periods of time prior to Ames testing,

2) differing Ames results from testing portions of the same sample on different days,

3) varying exhaust NO_2 concentrations during sample collection, and

4) differing Ames results from different samples generated by the same car over the same test sequence. (7, 8, and 9)

Since these data are preliminary and are few in number, we have not generated any conclusions from these data.

The Ames procedure was described by an EPA contractor, Southwest Research Institute (10):

> The term "Ames Bioassay" is colloquial, and it refers to a bacterial mutagenesis plate incorporation assay with Salmonella typhimurium according to the method of Ames, et al. This bioassay determines the ability of chemical compounds or mixtures to cause mutation of DNA in the bacteria, positive results occurring when histidine-dependent strains of bacteria revert (or are mutated) genetically to forms which can synthesize

histidine on their own. The observable positive indication of mutation is the growth of bacterial colonies on plates of nutrient media containing minimal histidine, with the number of revertants per amount of substance tested (or "specific activity") being the quantitative result. The observable negative indication is the lack of such growth. A third result occurs when the substance tested is toxic to the bacteria, but this result can not be interpreted in terms of mutagenesis. Results of the Ames Bioassay have been shown to correlate strongly with carcinogenic action on animals for individual chemicals. No such results are known for complex mixtures of chemical substances.

Regeneration Techniques

Regeneration is any procedure by which the trap is purged of accumulated particulates (usually by oxidation) and is returned to its "zero-mile" condition.

For the Mercedes, Peugeot, and Toyota

The same regeneration technique was used for all vehicles in this program except the Toyota when the catalyzed Bridgestone traps were tested and the VW Rabbit. The technique was to throttle the intake air for 8 minutes (to achieve a trap inlet temperature of at least 950°F) followed by an additional 4 minutes of unthrottled operation, all while driving at 60 mph steady state on a chassis dynamometer. Throttling increases the fuel/air ratio which increases the exhaust gas temperature. The hot exhaust gas causes regeneration of the trap. Throttling was accomplished by having an individual (other than the driver) manually operate a throttle which EPA had installed between the air cleaner and the intake manifold.

A similar technique was used on the Toyota with catalyzed Bridgestone traps. The vehicle speed was maintained at 60 mph, and intake manifold vacuum was adjusted to a preselected value for eight minutes to achieve a preselected trap inlet temperature. Depending on the particular test, the preselected value for manifold vacuum varied from 0 to 8 inches of mercury. The vehicle was then operated unthrottled for at least an additional four minutes.

Three other regeneration techniques were considered for use with the first three vehicles in this program. Those techniques were:

1. A secondary flame, such as used in oil furnaces, to produce high temperatures in the trap without affecting engine performance.
2. Operation of the engine at high speed and high load conditions to produce sufficiently high exhaust gas temperatures.(4)
3. Addition of catalysts to the fuel to provide a sufficient exotherm to raise the exhaust gas temperature to oxidize the Diesel particulates under certain operating conditions. (5)

The technique of throttling was used because it was the easiest to do and required little special equipment. While this method is acceptable for laboratory testing, it is not necessarily representative of a system which might be used commercially.

For the VW Rabbit

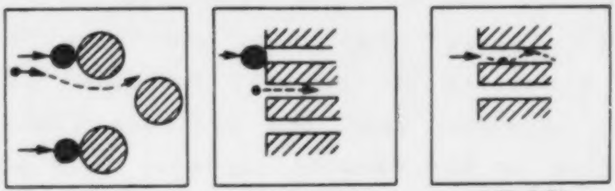
Four changes were made to the vehicle by Johnson Matthey. A pump-type air injection (AIR) system was added. The AIR system was actuated by the shift indicator light. Whenever the shift indicator light would be on, the AIR system would be on. The

AIR system would normally be off during a regeneration. Also, Johnson Matthey added an EGR system which was turned on with a manually controlled valve. The regeneration system also included a JM-13 catalyzed trap which was installed in place of the muffler. A feature of the fuel injection system was that fuel could be injected into two cylinders near bottom dead center just prior to the exhaust stroke. This additional fuel was injected too late to burn properly, but was cracked into lighter hydrocarbons and CO in the hot end gas in the cylinder. These emissions were then exhausted to the catalyzed trap, and these helped initiate the regeneration process. The regeneration was carried out under manual control by two people. The driver would turn on the additional fuel using a switch in the passenger compartment, and a technician would manually turn on the EGR and air injection systems.(3,11) The fuel control switch would be turned off after 90 seconds. The EGR and AIR systems would remain on for an additional four minutes. The regeneration sequence was completed in a total of five and one-half minutes. The vehicle speed was 50 mph for the complete sequence.

Trap Description and History

Only mechanical particulate trapping systems were tested as part of this study. Other systems such as electrostatic precipitation, thermal precipitation, and cyclone separation have also been investigated in other studies as possible trapping systems for particulate emissions from light-duty Diesel powered vehicles.(4)

Mechanical trapping mechanisms, shown in Figure 1, consist of impaction, interception, and diffusion.



IMPACTION (Wire Mesh or Ceramic Fiber) Non-Blockable

INTERCEPTION (Porous Ceramic) Blockable (Full Filtration)

DIFFUSION (Porous Ceramic, Wire Mesh And Ceramic Filter)

Figure 1

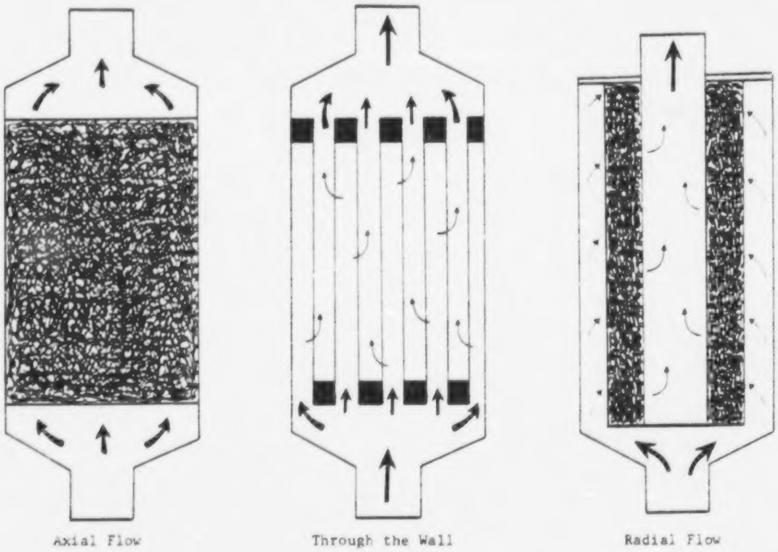
Mechanical Trapping Mechanisms (4)

W. Wade, of the Ford Motor Company, described those trapping mechanisms (4):

> Impaction and diffusion are the primary trapping mechanisms of a wire mesh or ceramic fiber trap. The larger sizes of particulates impact on filaments of the mesh and adhere to the surface of the filaments or [to] particulate material previously collected on the filaments. Some of the smaller sizes of particulates migrate to the surfaces of the filament or previously collected particulate material by diffusion and are retained. This type of trap is sometimes called a nonblockable trap, because an exhaust flow path will usually exist which cannot be blocked by the accumulation of particulate matter. Although these traps tend to have relatively low pressure drops, disadvantages that have been observed include moderately low collection efficiency and blow-off of collected particulates.
>
> Interception is the primary trapping mechanism of a porous material trap, although diffusion may also enhance the collection efficiency of this type of trap. Particulates larger than approximately the mean pore size of the material are intercepted and prevented from passing through the material. As additional particulate material is accumulated on the

surface of the trapping material, the effective pore size may be reduced, thereby causing efficiency to increase with the collection of smaller sizes of particulates. Traps using the interception method of collection are sometimes called blockable, or full filtration traps. Although blow-off of collected particulates is not a problem with this type of trap, back pressure and rate of back pressure increase tend to be somewhat higher than with non-blockable traps.

Particulate traps can be classified by the flow characteristics of the exhaust gas, as depicted in Figure 2.



Axial Flow Through the Wall Radial Flow

Figure 2

Exhaust Flow Characteristics through
Exhaust Particulate Traps (2)

As indicated in Table 8, each of these three types of flow characteristics is represented among the 30 traps tested in this study.

The balance of this report will consist of a discussion of each of the 30 traps which were tested. The traps will be grouped by their flow characteristics and presented in the order in which they appear in Tables 1, 2, 3, and 8 (i.e., first axial flow traps, followed by radial flow traps, and finally through-the-wall flow traps).

Axial Flow Traps

The following 13 traps are the axial flow type:

1. Texaco A-1R Trap:

This trap was 6.7 inches in diameter and 23 inches in length. It employed axial flow and used as a substrate a metal wool mesh (called "Carpenter 20") coated with alumina. (See Figure 3.) The trap was received from Texaco Laboratories on April 26, 1979, was installed on the Mercedes 300D, and began testing on May 5, 1979.

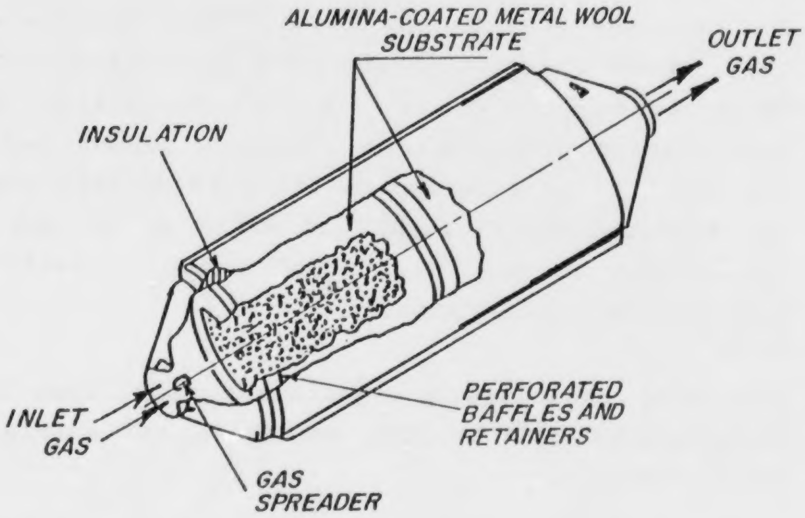

ALUMINA-COATED METAL WOOL SUBSTRATE
OUTLET GAS
INSULATION
PERFORATED BAFFLES AND RETAINERS
INLET GAS
GAS SPREADER

Figure 3

A Typical Texaco Trap with a Portion of the Container Removed

Exhaust backpressure (EGBP) readings were taken two or three times a day at 40, 50, and 60 mph steady state conditions. The plan was to perform mileage accumulation until the EGBP was twice the "zero-mile" value of 31 inches of water at 60 mph. (No muffler was installed.)

After accumulating 780 miles, the trapping efficiency had dropped from 60% to 30% and the EGBP had doubled. The trap was then regenerated using throttling. After that regeneration, the efficiency had returned to the "zero-mile" values; however, the EGBP was 50 inches of water at 60 mph. A visual inspection of the trap showed a "clean" core with substantial particulates on the sides.

The trap was sent to the local Climax Molybdenum laboratory, where it was regenerated in a recirculating oven at 925°F for 6 1/2 hours. Visual inspection after that regeneration indicated no residual carbon particulates. The trap was reinstalled on the test vehicle and the EGBP was measured at 35 inches of water at 60 mph which was very close to the "zero-mile" value. Testing on this trap was then terminated.

This trap exhibited a significant reductions in both TP (50%) and HC (40% to 50%) emissions and a relatively low EGBP penalty.

2. Engelhard CST-1 Coating of a Texaco A-1R Trap:

A second Texaco A-1R trap was coated by Engelhard with a catalytic material they designated as CST-1. Since this coating is being patented, Engelhard did not reveal its composition to EPA.

Prior to testing, a visual inspection of the trap showed a separation between the coated mesh and the trap tubing. This separation was apparent at both ends of the trap but was not continuous since light could not be seen through any part of the trap. The decision was made to install the trap on the Mercedes and to begin testing.

Daily measurements failed to show any increase in EGBP with mileage accumulation. However, after the initial two "zero-mile" highway (HWFE) tests, the TP measured on the HWFE tests had increased to about three times the baseline (i.e., "dummy" trap which was an empty trap container) values.

In order to explain the high TP emissions measured on the HWFE test cycles, additional tests were performed on July 23, 1979. Sulfate (SO_4) measurements of the TP data were taken. This additional testing consisted of a cold start 2-bag LA-4, a 10 minute soak, a hot start 2-bag LA-4, a preconditioning highway cycle, and two HWFE sample cycles. The resulting data appear in Appendix E-1. Those data explain the high TP emissions found on the HWFE tests since most of the total particulate was sulfate particulates rather than carbon particulates.

This trap exhibited a significant reductions in HC (90%), CO (over 95%), and FTP TP (40%) emissions. Also, there was no indication that regeneration was necessary in the approximately 1,000 miles accumulated.

Ames tests performed on the TP (only strains TA98 and TA100 were run due to the small quantity of extractable organics) indicated fairly normal Diesel particulate activity.

3. Engelhard CST-1 Coating of a Second Texaco A-1R Trap:

The first Texaco-Engelhard CST-1 trap had a visible separation of the metal mesh from the container. While this separation did not run the full length of the trap, it appeared that the trap may have been damaged either during the catalyst coating operation or during thermocouple placement. The first (non-catalyzed) A-1R trap was oven-baked to remove all particulate and sent for catalyst treating. There was no separation evident in this trap, which was designated CST-1 #2. This second catalyzed A-1R trap was installed on the same car, and tested to determine if the lower trapping efficiency of the first catalyzed trap was due to that separation or to some other phenomena.

Zero-mile testing of this trap confirmed the reduced TP trapping efficiency found on the HWFE test cycles using the first catalyzed A-1R trap. Based on the high sulfate emissions, that reduced efficiency is probably due to the increased sulfates generated in the trap which would raise the total particulate measured during the test. These traps are thus replacing carbon based particulates with sulfate particulates. This replacement makes the trap appear to be less efficient.

To determine the durability of the trap, the test vehicle with the CST-1 #2 trap installed was put on mileage accumulation. The mileage was accumulated on a dynamometer using an LA-4 driving cycle. Exhaust gas back pressure (EGBP) measurements were taken at 40, 50, and 60 mph steady state every 22.5 miles. Highway cycles were run when the EGBP reached higher levels. These highway cycles usually caused the EGBP to drop significantly. Mileage accumulation continued for approximately 2,000 miles.

The EGBP rose very gradually as shown below:

Miles Accumulated	EGBP (inches of water) 40 mph	50 mph	60 mph
"Zero-mile"	18	26	38
249	19	28	41
492	20	29	42
742	20	30	43
1,000	21	33	45
1,220	23	33	47
1,510	25	38	55
1,757	26	40	58
1,965	25	39	57

The emissions data from the testing, performed after the mileage accumulation, were scattered; however the data demonstrate that the efficiency of the trap to reduce FTP TP emissions was greatly diminished.

We did not examine how this trap would perform on low sulfur fuel.

The remaining ten (10) axial flow traps are all made from ceramic foam. These traps have been called W.R. Grace, Toyota, and Bridgestone traps; however, Bridgestone was the source of the ceramic foam used in all 10 traps. When the samples are designated as "W.R. Grace" or "Toyota" traps, the samples were provided to EPA by W.R. Grace or Toyota respectively - not Bridgestone.

The structure of the ceramic foam is illustrated below in Figure 4 which is a photograph of Bridgestone's ceramic foam enlarged 100 times.

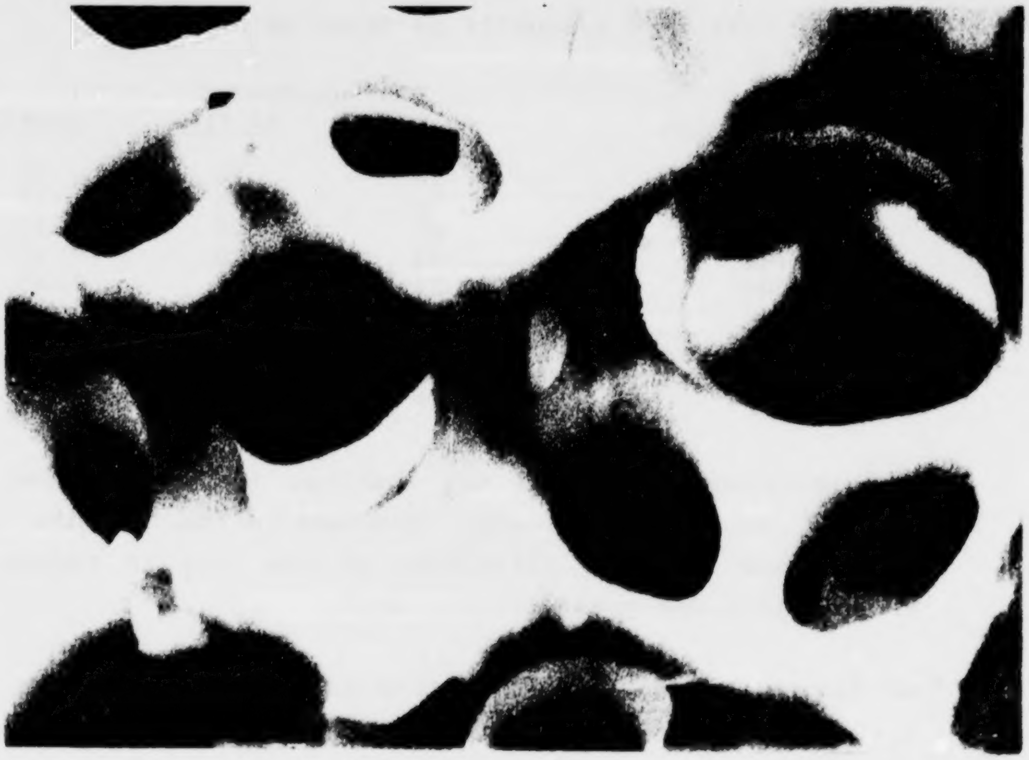


Figure 4

Enlarged Photograph of Bridgestone Ceramic Foam Cells (Magnified 100 Times)

4. W.R. Grace U13U13U25U25U30U30 Trap:

W.R. Grace shipped to EPA a set of ceramic biscuits. Each biscuit was cylindrical having a length of 2.0 inches and a diameter of 5.5 inches. The biscuits were provided in a variety of mesh densities and in both catalyzed and uncatalyzed versions. By combining various biscuits, we formed the four W.R. Grace traps used in this study.

This trap, U13U13U25U25U30U30, was composed of ceramic foam and was Uncatalyzed. It consisted of six separate cylindrical sections (i.e., biscuits) of ceramic foam. There were two cylinders of each of three mesh grades used in the trap. The mesh grades were 13, 25, and 30. The "13" mesh was the coarsest and the "30" mesh was the finest. The cylinders were arranged with the coarsest material in front (i.e., upstream) and the finest material in back. Hence, the designation U13U13U25U25U30U30 was used, U referring to uncatalyzed. Exhaust gas flow was in the axial direction.

The trap was installed on the Toyota in March, 1982. The testing of this trap was very brief - a single FTP - due to high exhaust backpressure. Zero mile backpressures were 62, 96, 146, and 203 inches of water at 30, 40, 50, and 60 miles per hour respectively. With an empty can in place of the trap these backpressure values are typically about 5 to 12 inches of water.

The FTP result with the trap and the average of the previous two tests with the dummy trap (or empty can) are shown in Appendix A-3. Particulate trapping efficiency exceeded 80% and HC was reduced a little, but the exhaust backpressure was too high in our opinion.

5. W.R. Grace U13U13 Trap with 8 Inch Spacer:

The previously tested trap, designated W.R. Grace U13U13U25U25U30U30, was disassembled and the back four cylinders of foam were removed. This left two uncatalyzed, grade 13 biscuits. The space which was formerly occupied by the back four cylinders was filled with an eight inch spacer. The spacer was a previously tested Corning trap with both ends cut off. Backpressure of the spacer was not measured, but we assume it is small and relatively insignificant.

This trap was also installed and tested on the Toyota during March, 1982. Backpressure was reduced considerably with the revised trap. It now ranged from 14 inches of water at 30 miles per hour to 60 inches of water at 60 miles per hour. Two FTP tests and two highway tests were run. The results are shown in Appendix A-3. Trapping efficiency had fallen (compared to the previous trap) to about 50%. Approximately 150 miles were accumulated on this trap during our testing. No regenerations were attempted. Since trapping efficiency was somewhat low, the trap was removed from the vehicle to allow evaluation of the next trap.

6. W.R. Grace U25U25 Trap with 8 Inch Spacer:

The two center sections of the first W.R. Grace trap (i.e., the two uncatalyzed grade 25 biscuits) were combined with the eight inch spacer from the preceding trap to form this trap.

This trap was also installed and tested on the Toyota during March, 1982. Since the "25" grade mesh of this trap was finer than the grade "13" mesh of the previous trap, we expected both higher exhaust backpressures and higher efficiencies. Our expectations were confirmed, since the zero mile backpressures were 22, 41, 62, and 95 inches of water at 30, 40, 50, and 60 miles per hour respectively. The trapping efficiency had increased to about 60 percent.

7. W.R. Grace CA13CA13 Trap with 8 Inch Spacer:

The trap system designs which were considered by W.R. Grace and EPA to be most promising were configuarions with larger (i.e., coarser) meshes in front and smaller (i.e., finer) meshes in back. We wanted to eventually mix catalyzed and uncatalyzed biscuits to see if the catalyst could be protected somewhat by the use of uncatalyzed larger meshes in the inlet or if the regeneration process could be enhanced by the use of catalyzed biscuits in front of uncatalyzed biscuits. This work was not done because of the backpressure problems.

The trap consisting of the 8 inch spacer and two grade 13, catalyzed biscuits (expected to have the least backpressure of the catalyzed samples) had zero mile backpressures of about 40, 75, 120, and 180 inches of water at 30, 40, 50, and 60 miles per hour respectively. Since initial backpressure was even higher than the uncatalyzed grade 25 samples, only one FTP was run with this trap. It yielded an HC efficiency of about 75 percent and yielded CO and particulate efficiencies of about 60 and 65 percent respectively.

8. Toyota Foam Non-catalyzed Trap:

Toyota supplied an uncatalyzed, ceramic foam trap. This trap had a length of 5.9 inches and an elliptical cross section with diameters of about 3.6 and 5.7 inches. The trap was installed on the Toyota, and testing began in April, 1982. A total of 2,200 kilometers (1360 miles) was then accumulated with this trap. The trap was regenerated twice with a total of 868 km (539 mi) accumulated between those regenerations. The EGBP (measured at 60 mph) rose slowly from between 75 to 85 inches of water at the zero-mile point and just after each regeneration to about 150 inches of water just prior to regeneration.

The trapping efficiencies were about 30 percent (32.6 percent on the FTP driving cycle and 29.5 percent on the highway cycle). The effects on HC, CO, NOx, and fuel economy were small.

9. Bridgestone #1 Trap:

The Bridgestone Tire Company, Limited provided EPA with a total of five ceramic foam traps. Each trap was 150 mm (5.9 inches) in length and had an oval-shaped cross section with diameters of 150 mm and 300 mm (5.9 inches and 11.8 inches). This shape was selected to provide a large frontal area. The large frontal area was expected to provide an improved combination of backpressure and trapping efficiency.

The first trap, denoted Bridgestone #1, had a mesh grade of "13" and was uncatalyzed. This trap was installed on the Toyota, and testing began in August, 1982. After two sets of FTP and highway tests, we observed only a slight reduction in particulates with this trap. An examination of the trap revealed a leak between the trap and container which permitted the exhaust gas to bypass the trap. Since we were unable to repair the leak without damaging the trap, we terminated the testing. The Toyota trap's increasing efficiency after regeneration, regeneration interval of 539 miles, and backpressure levels prior to regeneration suggest that the Toyota trap may also have had leaks between the trap and the container.

10. Bridgestone #1-2 Trap:

The second trap that Bridgestone provided was identical in size and shape to the previous trap. It differed by having a finer mesh, designated "20". This trap was also uncatalyzed. Additional gaskets were added to this and subsequent Bridgestone traps to avoid exhaust gas leaks between the trap and the container.

The trap was installed on the Toyota, and testing began in October, 1980. A total of 1,588 kilometers (987 miles) was accumulated with this trap. The trap was regenerated six times with an average of 226 km (140 miles) between regenerations. While the trapping efficiencies averaged 68 percent on the FTP and 76 percent on the highway cycles, the actual efficiencies exhibited a tendency to increase with mileage accumulated after each regeneration. Likewise, the EGBP increased from about 70 inches of water at 60 mph after each regeneration to between 150 to 200 inches just prior to the next regeneration.

This trap also exhibited a slight control of HC (about 30 percent) and no major effects on CO, NOx, or fuel economy.

11. Bridgestone BS2-1 Trap:

The third Bridgestone trap was nominally identical to the first Bridgestone trap which was terminated because of a leak.

The trap was installed on the Toyota, and testing began in January, 1983. A total of 1,569 kilometers (975 miles) was accumulated with this trap. The trap was regenerated four times with an average of 363 km (225 miles) between successive regenerations. As with the previous trap, this trap exhibited, after each regeneration, a trend of increasing trapping efficiencies. However, this trend was not as apparent as it was with the previous trap. Also, the overall trapping efficiencies (53 percent on the FTP and 57 percent on the highway) were less than with the second Bridgestone trap.

The differences between these two uncatalyzed Bridgestone traps (increased mileage between regenerations, decreased EGBP, and decreased trapping efficiencies for the BS2-1 as compared to the #1-2) probably result from the coarser mesh of BS2-1.

12. Bridgestone Foam Catalyzed Trap:

The fourth Bridgestone trap was a ceramic foam trap of the same size and shape as the preceding three. It was coated with a base metal catalyst, designated C-1, which is described in reference 12. Its mesh grade was designated "24".

The trap was installed on the Toyota, and testing began in April, 1983. This trap exhibited fairly low EGBP which varied from a zero-mile value of 33 inches of water to less than 80 inches of water (both measured at 60 mph) just prior to regeneration. The trap reduced particulate emissions on both the FTP and highway driving cycles by over 70 percent. The trap also reduced HC emissions by over 20 percent but had only marginal effects on CO, NOx, and fuel economy.

13. Bridgestone Foam #2 Catalyzed Trap:

The fifth Bridgestone trap was a catalyzed version of their second trap (#1-2). This trap had a "20" mesh and was coated with a catalyst designated C-2 (different from the C-1 used on the previous trap).

The trap was installed on the Toyota, and testing began in May, 1983. The results of the testing closely paralleled those of the preceding trap in terms of mileage accumulations between regenerations, EGBP, trapping efficiencies, and its effect on HC, CO, NOx, and fuel economy. Particulate trapping efficiency was 70% on the FTP and 75% on the Highway Cycle. HC was reduced by over 30% on the FTP and about 45% on the Highway Cycle.

Radial Flow Traps

The following 6 Traps are the radial flow traps:

1. Balston Filter:

In order to evaluate the feasibility of a disposable trap, Balston Filter Corporation was contacted. For a feasiblity study, a 7-parallel tube configuration was specified. Each tube was constructed of fibrous material and plugged at the outlet end, thus producing radial flow. The filter holder was not installed under the car but rather at the inlet to the dilution tunnel.

Unfortunately, one of the seven trapping elements failed after the second sequence of zero-mile tests. The trapping efficiency (for FTP TP) dropped from 90% on the first FTP to 30% on the second FTP. Due to the failure of one of the trapping elements, we cannot determine whether the efficiency would have stabilized; and, if so, what that efficiency would have been.

2. Johnson Matthey JM-4 #1 Trap:

The Johnson Matthey JM-4 #1 trap is a catalyzed knitted wire (called "309 Stainless") mesh design which is incorporated into the exhaust manifold. This trap was 5.1 inches in diameter and 16.9 inches in length. The exhaust gas flows radially through the mesh. (See Figure 5.) Both the exact configuration of the mesh and the composition of the catalyst were considered trade secrets, and neither was revealed to EPA.

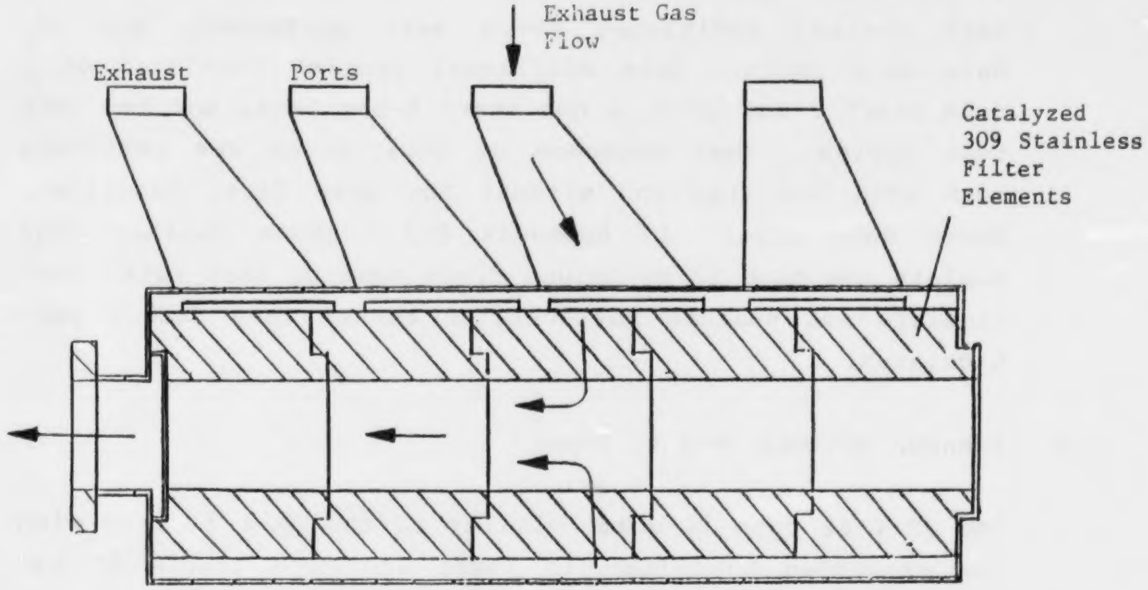


Figure 5

The Johnson Matthey Particulate
Trap and Exhaust Manifold (JM-4)

The trap was installed on a 1978 Peugeot 504 Diesel, and testing began in November, 1979. "Zero-mile" testing indicated significant reductions of HC, CO, and FTP TP emissons; however, the highway (HWFE) TP emissions were higher than the baseline values. The FTP TP trapping efficiency was reduced to zero by the 600 mile point. The 600 miles were accumulated by running LA-4 cycles with occasional HWFE cycles. The EGBP would drop significantly when HWFE cycles were run. Because the FTP, HWFE, and LA-4 tests at 600 miles showed TP emissons higher than the corresponding baseline values and because the EGBP was quite high, the testing of this trap was terminated.

In order to explain the high TP emissions measured on the test cycles, additional tests were performed, and SO_4 data were taken. This additional testing consisted of a cold start 2-bag LA-4, a hot start 2-bag LA-4, and two HWFE test cycles. That sequence of four tests was performed both with the trap and without the trap (i.e. baseline). Those data appear in Appendix E-2. Those sulfate data explain the high TP emissions since most of that total particulate was sulfate particulates rather than carbon particulates.

3. Johnson Matthey JM-4 #2 Trap:

The JM-4 #2 trap is quite similar to the JM-4 #1 trap with the exception that EGBP is lower and more stable in the JM-4 #2. This is due to a redesign of the earlier version which improved flow characteristics, according to Johnson Matthey.

Testing of the trap for 600 miles produced emission results similar to the JM-4 #1 trap except that the FTP TP emissions did not deteriorate. Johnson Matthey personnel suggested that the solution to the increased sulfate emissions was to put an additional 1,000 miles on the trap. The 1,000 miles were accumulated at 55 mph steady state conditions. However, that added mileage did not substantially reduce the sulfate emissions.

This trap was then tested using a low sulfur content fuel (less than 12 ppm sulfur). Those tests indicated substantial reductions in HC (95%), CO (96%), and FTP TP (60%) emissions. However, there was a moderate increase in HWFE TP emissions (28%) relative to the baseline data.

4. Johnson Matthey JM-13 Trap:

Johnson Matthey provided a third catalyzed trap (JM-13), this time for the VW. This trap used a catalyzed "304 Stainless" wire mesh instead of the "309 Stainless" used in the JM-4 traps. They installed the trap and equipped the VW with a regeneration system which, when manually activated, would inject additional fuel into two cylinders just prior to the exhaust stroke. In addition, they installed a pump-type air injection system and an EGR system.

The car, equipped with the trap and regeneration system, was returned to EPA in June, 1982. The car was then tested, with a dummy trap, and the results were compared with the test results that were obtained prior to shipping the vehicle to Johnson Matthey. The data indicated that the HC emissions had increased substantially. Upon investigating, we determined that the regeneration system was allowing some fuel to be injected off-cycle, even though the driver had not activated the regeneraton system. To eliminate this off-cycle injection, the additional fuel lines were plugged except during regeneration cycles.

The trap was reinstalled, and testing resumed in July, 1982. The trap was successfully regenerated 20 times, averaging 125 miles between each regeneration. This newer version of the Johnson Matthey trap not only achieved a higher trapping efficiency (80 percent) on the FTP than did the two earlier versions that we tested on the Peugeot, but it also achieved good control of particulate emissions during the highway cycle (a 40 percent reduction as opposed to an increase in particulates). This catalyzed trap also reduced HC and CO emissions by 80 percent.

The amount of total particulate emitted during each regeneration varied considerably (as shown in Appendix B-3) from 3.15 grams to 21.25 grams. This suggests that particulate may have occasionally been blown off instead of being oxidized. Sulfate filters have not been analyzed; therefore, sulfate dumping cannot be elilminated as a contributing factor.

This trap produced higher backpressure than did the earlier ones. The backpressure, measured at 60 mph, for the JM-4 #2 trap varied between 70 and 90 inches of water. The backpressure for this trap, at 60 mph, varied from 65 to 90 inches of water (after each regeneration) to 120 to 200 inches of water (just prior to each regeneration).

5. ICI Saffil Trap:

This trap, designed by Imperial Chemical Industries Limited (ICI), consists of a series of parallel labyrinths which facilitate diffusion trapping of submicron particles on the "Saffil" (a polycrystalline alumina, Al_2O_3) fiber as the exhaust gas flows radially down the labyrinths formed by crimped woven wire. (See Figures 6 and 7.) The current use of the "Saffil" fiber is in furnace linings at about 1450°C. Silver nitrate was applied to the fibers as a catalyst. The dimensions of the container were 5.3 inches in diameter and 20.8 inches in length.

The trap was installed on the Mercedes, and testing began on August 2, 1979. "Zero-mile" data indicated a trapping efficiency of 45% (for FTP TP). After 600 miles, the EGBP had doubled and the TP emissions exceeded the baseline values. At this point, the trap was regenerated by throttling.

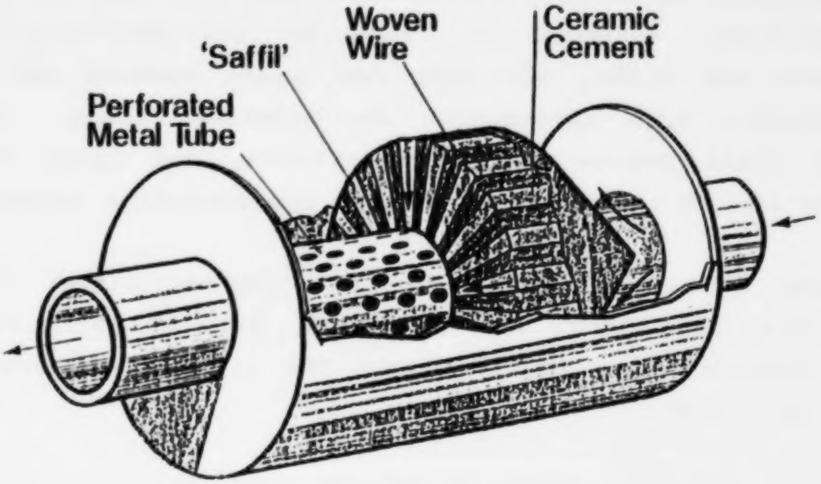

Woven Wire
Ceramic Cement
'Saffil'
Perforated Metal Tube

Figure 6

The ICI Particulate Trap with Part of the Container and Filter Elements Removed

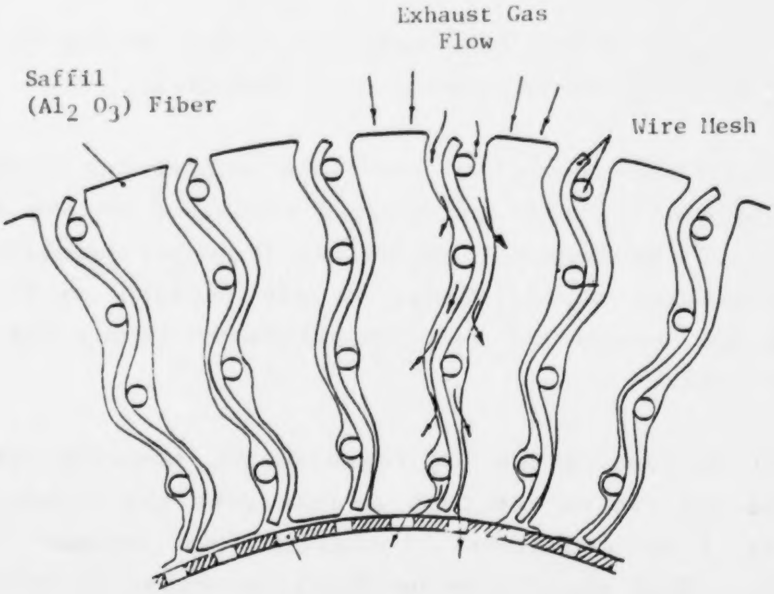

Exhaust Gas Flow
Saffil (Al_2O_3) Fiber
Wire Mesh

Figure 7

Cross Section of the Filter in the ICI Particulate Trap

Following the regeneration, both the EGBP and the trapping efficiency returned to close to the zero-mile values. After 300 miles, the EGBP had again doubled and the TP emissions were approaching the baseline values. The trap was again regenerated by throttling, and again both the EGBP and TP returned to close to the zero-mile values.

Those two regenerations did not improve either the fuel economy or the FTP NOx emissions, both of which continued to deteriorate slightly during the 1,300 miles accumulated on this trap.

Additional tests were performed with the trap installed, and sulfate data were taken. Those data appear in Appendix E-1. Those data indicate that sulfates are not a major problem for this catalyzed trap.

The results of the Ames tests performed on the TP basically showed normal Diesel particulate reactivity.

One of the important questions concerning "regeneration techniques" is that of vehicle emissions during the regeneration. Because the ICI-Saffil trap had demonstrated good regenerative capabilities, it was decided to load up the trap and sample the vehicle emissions during the regenerative cycle.

Prior to running the ICI regeneration sampling attempt, the cycle was run on the test vehicle with the "dummy trap" (an empty trap container) installed (on October 15 & 16, 1979). This would give us baseline values to determine the results of the regeneration.

The ICI trap was then installed and put on LA-4 mileage accumulation. The first mileage loading was quite light and resulted in an increase in EGBP of only about 10 inches of water. A regeneration was attempted on October 19 using the cycle described above. A small decrease in EGBP was noted. The vehicle was returned to mileage accumulation and loaded to a 60 mph EGBP of 63 inches of water. The regeneration cycle was again attempted. This time the trap regenerated successfully, and the 60 mph EGBP was reduced to 43 inches of water.

In comparison to the "dummy trap" data, regeneration data indicate that:

1) Hydrocarbons remain about the same,

2) CO rises significantly but is still quite low in absolute value,

3) NOx is slightly reduced,

4) Fuel economy was not noticeably affected, and

5) Particulate emissions were down 42% during the throttled cycle and 12% during the unthrottled cycle.

These results clearly indicate that, for this vehicle/trap combination, the regeneration cycle is successfully oxidizing the particulate, not just blowing the particulates out of the trap and into the atmosphere. These results indicate that on this vehicle and with this trap, using FTP and HFET cycles to evaluate total emissions, including particulate, is sufficient and a "regeneration test" procedure may not be needed to evaluate emissions during regeneration.

The other result of this testing series was the continued capability of the ICI trap to successfully regenerate. The low mileage trap has been regenerated five times and has accumulated over 1750 miles.

6. ICI Saffil Fourth Generation Trap:

A second ICI Saffil trap, with increased density of the Saffil fibers compared to the first ICI trap, was installed and tested on the Mercedes from October, 1980 through April, 1981 and then was later installed and tested on the Toyota during September and October of 1981.

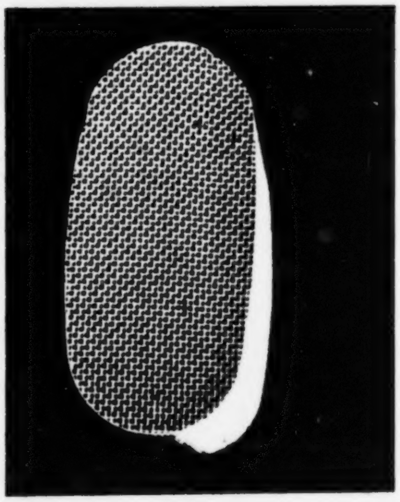
When this trap was tested on the Mercedes, the FTP TP emissions actually increased over the baseline values. (Even if the one questionable test were ignored, the FTP TP emissions with the trap exceed the average TP emission from the five baseline tests.) The trap was then baked at 1000°F for two hours and installed on the Toyota.

When tested on the Toyota, this trap produced a reduction of FTP TP of only 27.8%. However, the EGBP at 60 mph never exceeded 28 inches of water compared to a baseline value of 13.

A phenomenon associated with this trap is that the baseline TP emissions of both vehicles increased after this trap was tested. After several more tests, the baseline returned to normal. This happened with both vehicles when tested with the ICI Saffil fourth generation trap. Since only the TP emissions were affected (i.e., all other measured parameters, HC, CO, NOx, CO_2, and fuel economy, all returned immediately to their respective baseline values), it is possible that small amounts of trap material were deposited in the exhaust system and were later deposited on the particulate collection filters.

Through-the-Wall Flow Traps

Each of the "through-the-wall" flow traps in this study was a cellular ceramic honeycomb with porous walls which act as the filter medium. The filter concept involves blocking alternate cell channel openings on the monolith face in a checkerboard type fashion as seen in Figure 8. The opposite end is similarly blocked but one cell displaced so that the gas cannot flow directly through a given channel. The exhaust gas enters the upstream open end of the cells. Since the downstream end of the cell is blocked with a ceramic plug, the exhaust gas is forced through the porous wall to exit through an adjacent cell, as shown in Figure 9. (13)



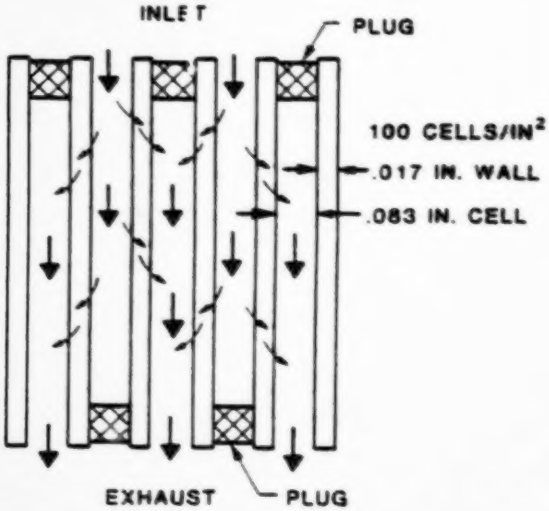


Figure 8

Monolith Face of a Typical Corning Trap(13)

Figure 9

Particulate Trapping Concept Used in the Corning and NGK-Locke traps(4)

Through-the-Wall flow is characteristics of the following 11 traps:

1. Corning EX-40 6" Non-catalyzed Trap:

Corning provided EPA with six ceramic monolith traps. Each was cylindrical with a 5.66 inch diameter. All but the last sample had 100 cells per square inch and 17 mil walls. The traps differed from one another by length, porosity, and number of cells per square inch (or cell density). Some of the Corning samples were shipped by EPA to Engelhard and UOP to be catalyzed.

This trap, EX-40, was 6 inches long by 5.66 inches in diameter (called a 6 by 6). The length of the trap is quite easily changed in the manufacturing process.

The trap was installed on the Mercedes, and EGBP readings were taken after 7.5 miles of accumulation. The EGBP was quite high and since the 12 inch version was expected to yield comparable efficiencies but at lower EGBP, the 6 inch trap was removed after one test sequence. Full scale on the EGBP measurement system was 73 inches of water at this time. The scale was expanded for later testing.

	EGBP (in inches of water)			
Odometer	30 mph	40 mph	50 mph	60 mph
34,907		44	60	over 73
34,914		54	73	over 73
34,962		69	over 73	over 73
34,982	54	over 73	over 73	over 73

The single set of emission results indicated a significant reduction in both HC and TP emissions. TP was reduced by about 80% on the FTP and Highway Cycles.

2. Corning EX-47 6" Non-catalyzed Trap:

The Corning EX-47 trap is the same design and size as the EX-40 trap but with increased mean pore diameter. The increased mean pore diameter was supposed to decrease the EGBP penalty without sacrificing the high trapping efficiency of the EX-40 trap.(13) However, when this trap was installed on the Mercedes and the EGBP measured at "zero-mile", it was found to exceed 105 inches of water at 60 mph. (The maximum EGBP we could measure had been extended from 73 to 105 inches of water.) Thus, only the "zero-mile" emissions were measured.

Based on only the "zero-mile" data, the EX-47 trap, like the EX-40, showed a significant reduction (over 60%) in TP emissions as well as a moderate reduction in HC emissions.

3. Engelhard CST-1 Coating of a Corning EX-47 6" Trap:

A second EX-47 6-inch trap was sent to Engelhard where the same CST-1 catalyst used on the Texaco trap was applied. The trap was installed on the Mercedes and testing began in January, 1980. The EGBP was acceptable at first, but it rose very rapidly (from 53 to 92 inches of water at 50 mph during the first 125 miles). A regeneration was attempted but no reduction in EGBP was noted.

Based on only the "zero-mile" data, this trap exhibited signficant reductions (over 60%) in HC, CO, and FTP TP. However, the HWFE TP had increased above its baseline values. The trap was removed to allow testing of the 12 inch EX-47 traps.

4. Corning EX-47 12" Non-catalyzed Trap:

The Corning* EX-47 12" trap has the same diameter (5.66 inches) but is twice as long as the EX-47 6" traps. The trap was installed on the Mercedes, and testing began on February 12, 1980.

After the EGBP rose by a factor of 4 (from 26 to 101 inches of water at 50 mph), the trap was successfully regenerated. The trapping efficiency and EGBP returned to zero mile values. The trap was tested and loaded a second time and again successfully regenerated.

Upon completion of that second regeneration, mileage was accumulated on the trap without running HWFE cycles. The mileage accumulation would consist of FTP (3 bag) and LA-4 (2 bag) tests. When either performance or fuel economy became so degraded that a driver would notice a problem existed, an attempt to regenerate the trap would be made. This testing sequence continued until after 456 miles the 60 mph EGBP was above 365 inches of water (compared to a "zero-mile" value of 37 inches of water at 60 mph) and driveability of the vehicle was noticeably affected. The test vehicle would not idle and often stalled.

The trap was then regenerated. The test vehicle with some difficulty was accelerated to 60 mph steady state speed to achieve temperature stabilization. The trap began to regenerate itself without throttling. The 60 mph steady state EGBP dropped from about 365 inches of water to about 230 inches of water without throttling. The inlet manifold vacuum was then set to 9 inches Hg and the regular regeneration sequence commenced. Bag and particulate samples were taken for the 8 minute throttled portion and for the following 4 minute unthrottled portion. An additional reduction in EGBP was noted when the regeneration cycle was rerun. The trap outlet temperature rose very quickly when the throttling was first performed. The temperature difference between trap inlet and outlet indicated significant exothermic oxidation of the particulate. The EGBP returned to zero-mile values. The final FTP, HFET, and LA-4 test data indicated reduced trapping efficiency. This indicated that high temperature experienced during the regeneration and/or that the high back pressure noted during the mileage accumulation may have damaged the trap.

The results of the EX-47 12 inch non-catalyzed trap testing are impressive. The regeneration interval of over 200 miles and the high (over 60%) trapping efficiency show a good combination of measured performance parameters. The testing with the trap extremely loaded indicated that the trap would either regenerate or cause the vehicle to perform so poorly that a driver would recognize that a problem existed.

During the 889 miles of testing, the trap performed well.

5. UOP Coating of a Corning EX-47 12 inch Trap:

A second Corning EX-47 12 inch trap was coated by Universal Oil Products Inc. (UOP). The UOP code for the sample was identified as PZM-10171-01031138.

The trap was installed on the Mercedes, and testing began on April 16, 1981. However, it was removed after concerns were voiced over whether the emissions of the test vehicle were still stable. Baseline testing indicated a significant increase in FTP TP emissions in the test vehicle between October, 1980 and April, 1981.

Additional baseline (i.e. with the dummy trap) testing indicated that the Mercedes was stable.

Testing of the UOP EX-47 trap resumed in August, 1981. The emission data indicated significant reductions in HC, CO, and FTP TP; however, the HWFE TP exceeded the baseline values.

The EGBP (at 60 mph) increased from its "zero-mile" value of 35 inches of water to 121 inches after 414 miles, at which time the trap was regenerated using a 16 minute, 60 mph steady state, throttling process. The EGBP returned to close to its "zero-mile" value (46 inches of water at 60 mph). After 100 miles, the EGBP had risen to 102 inches of water at 60 mph, the trap was successfully regenerated for a second time, and the EGBP was measured at 40 inches at 60 mph. The EGBP again began to increase as mileage was accumulated until October 28, 1981 (at an odometer reading of 42,802) the pressure began to drop. After performing an FTP the next day, the trap was examined and found to have a radial crack 2/3 of the way down the trap which split the unit into two pieces. Testing was terminated.

6. Corning EX-47 12" Non-catalyzed Trap (version #2):

After reviewing the earlier data from Corning traps, we were interested in testing a sample from Corning which would provide less trapping efficiency and increased mileage intervals between regenerations. A trapping efficiency of 60-70% over the FTP was requested. A sample was received from Corning and was installed on the Mercedes on March 31, 1982. The sample was 5.66 inches in diameter and was 12 inches long. It had a cell density of 200 CPSI and a cell wall thickness of 12 mils. All the previous Corning traps had a wall thickness of 17 mils and cell density of 100 cells per square inch.

The trap consistently reduced particulate emissions to 0.1 g/mi or less. Average FTP trapping efficiency was 83%. It provided modest HC reductions and did not affect CO or NOx. Particulate emissions were also reduced substantially over the highway cycle.

This trap was regenerated twice using the standard regeneration procedure for the Mercedes. It was loaded up to the point where a third regeneration would have been done and was removed from the test vehicle. The regeneration intervals were 226, 140, and 133 miles.

7. NGK #1 Trap:

NGK-Locke, Inc. provided EPA with 5 cellular, ceramic, monolith traps which, like the traps submitted by Corning, employ filtration through porous walls. Each NGK trap was uncatalyzed and cylindrical in shape with a length of 12 inches and a diameter of 5.66 inches. The traps differed from one another by cell density, mean pore diameter, and wall thickness. The additional specifications of this trap (designated DHC-101) are:

Cell Density:	200 cells per square inch
Wall Thickness	0.012 inches

The trap was installed on the Toyota, and testing began in October, 1981.

The "zero-mile" data indicated good efficiency and low EGBP (only 25 inches of water at 60 mph compared to the baseline of 12 inches). After accumulating 1082 kilometers (672 miles), the EGBP had increased to 119 inches of water at 60 mph, and the trapping efficiency on the FTP had also increased to 82%.

After regeneration, the EGBP decreased to 30 inches of water, close to its "zero-mile" value, and the efficiency dropped to 63%. After accumulating an additional 708 kilometers (440 miles), the EGBP had increased to 108 inches of water, and the efficiency increased to 82% again.

The trap was then regenerated again, the EGBP dropped to 22 inches of water, and the efficiency dropped to 43%. After accumulating an additional 830 kilometers (516 Miles), the EGBP increased to 88 inches of water, and the efficiency increased to 49%.

The trap was then regenerated (for a third time), the EGBP dropped to 32 inches of water, and the efficiency increased to 70%.

The trap averaged more than 60% efficiency in reducing FTP TP, and more than 75% efficiency in reducing HWFE TP. Also, the trap averaged 771 kilometers (479 miles) between regenerations. The fact that the average regeneration interval for this NGK trap was more than twice that of any of the other four NGK traps is probably because the other four traps were installed on the Mercedes which had about twice the baseline particulate emissions of the Toyota.

8. NGK #2 Trap:

NGK-Locke, Inc. provided a second trap identical to their first except that this trap has only 100 cells per square inch with a wall thickness of 0.017 inches. The trap was installed on the Mercedes, and testing began in November, 1981.

The test results are similar to the NGK #1 trap except:

1. The "zero-mile" EGBP was higher (38 inches at 60 mph),

2. The EGBP dropped to 78, 70, and 56 inches at 60 mph after the first three regenerations (apparently the trap was not being fully regenerated),

3. The distance between regenerations averaged 185 miles, and

4. The trapping efficiencies averaged 87% on both FTP and HWFE.

9. NGK #3 Trap:

NGK provided a third trap (designated DHC-141) similar in specification to their first except that the mean pore size was greater. This trap was installed on the Mercedes, and testing began in May, 1982.

This trap, compared to the NGK #1 trap, exhibited:

1. Reduced trapping efficiency (under 50 percent).

2. Slightly reduced EGBP. (At zero mile and at 60 mph, this trap produced 21 inches of water of backpressure compared to 25 for the NGK #1).

After the fourth regeneration, tappping efficiency on the FTP dropped to under 30 percent. (Trapping efficiency on the FTP, between the third and fourth regenerations, had averaged 43 percent). This drop in efficiency led us to believe the trap was damaged. Testing was terminated so that the trap could be examined. We found that the outer circular edge of the outlet end of the trap had been damaged (i.e., worn down). The damage apparently was the result of the trap being improperly packed in the can, which permitted the trap to move axially. Because a portion of the trap was missing, some of the exhaust gas was able to escape without being filtered. This trap was returned to NGK for analysis of possible thermal damage.

10. NGK #4 Trap:

The fourth trap provided by NGK (designated DHC-221) was identical to the first and third in size, number of cells per square inch, and wall thickness. It differed from each of the previous three NGK traps by mean pore diameter. The mean pore diameter of this sample was larger than for DHC-101 (i.e., NGK #1 and #2) and smaller than for DHC-141 (i.e., NGK #3). This trap was installed on the Mercedes, and testing began on August 30, 1982.

This trap exhibited EGBP patterns (returning to 50 inches at 60 mph after regenerations) and efficiencies (over 80 percent) similar to NGK #2 but with increased distance between regenerations (170 compared with 115 miles).

11. NGK #4 (version 2) Trap:

A fifth trap provided by NGK was nominally identical to their fourth trap, and as expected, the results were also similar. This trap was equipped with seven thermocouples to monitor the temperature distribution within the trap during regenerations. We suspected, at that time, that some of the damage to NGK #3 resulted from an "over temperature" condition during a regeneration. However, the analysis by NGK of the damaged trap, completed three months later in February 1983, found no trace of damage due to melting.

This trap was also installed on the Mercedes, and testing began in November, 1982. Trapping efficiency for particulate exceeded 85% on both the FTP and Highway Cycles. HC emmisions were reduced by about 25% on the FTP and over 30% on the Highway Cycle.

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Appendix A-1

Emissions Test Data on Mercedes 300D

VEHICLE I.D. 11511412019885 (1975 MERCEDES BENZ 300D)

TEST NUMBER	TEST DATE	ODOM (mi)	TEST CYCLE	EMISSIONS (g/mi) HC	CO	NOx	TP	F.E. (mpg)	TRAP TYPE/COMMENTS
797304	03-22-79	29494	FTP	.77868	.8877	2.0041	.504	23.8482	Baseline
797303	03-23-79	29532	FTP	.36699	.9112	2.0478	.404	24.2037	Baseline
797305	03-23-79	29543	HWFE	.16229	.5749	2.0367	.306	29.3019	Baseline
MEAN (COUNT):			FTP (2)	.57284	.8994	2.0260	.454	24.0246	Fuel Economy mean is harmonic;
STANDARD DEVIATION:				.29111	.0166	.0309	.071		all other means are arithmetic.
MEAN (COUNT):			HWFE(1)	.16229	.5749	2.0367	.306	29.3023	
797036	03-30-79	29755	FTP	.25759	.9111	2.3367	.464	24.3978	45 degree SwRI elbow
797040	03-30-79	29767	HWFE	.10726	.5957	.8852	.327	28.6537	45 degree SwRI elbow
797431	04-03-79	29794	FTP	.27247	.9943	1.9380	.535	23.8729	45 degree SwRI elbow
797432	04-03-79	29805	HWFE	.08971	.5422	1.9870	.360	28.1109	45 degree SwRI elbow
MEAN (COUNT):			FTP (2)	.26503	.9527	2.1374	.500	24.1324	
STANDARD DEVIATION:				.01052	.0588	.2819	.050		
MEAN (COUNT):			HWFE(2)	.09848	.5690	1.4361	.344	28.3801	
STANDARD DEVIATION:				.01241	.0378	.7791	.023		
									Old trap; used for developing regeneration techniques.
797443	04-10-79	30347	FTP	.31306	1.0261	1.8594	.531	24.2028	Dummy Trap
797444	04-10-79	30366	HWFE	.04483	.5535	1.7893	.369	29.9401	Dummy Trap
797447	04-25-79	30637	FTP	.27529	.9377	1.9666	N/R	23.9334	Dummy Trap
797448	04-25-79	30658	HWFE	.11450	.5846	1.7922	.336	28.9796	Dummy Trap
797449	04-26-79	30671	FTP	N/R	.9315	1.8898	.537	24.3007	Dummy Trap
797450	04-26-79	30692	HWFE	N/R	.5659	1.7711	.349	29.2494	Dummy Trap
797451	04-27-79	30704	FTP	.24918	.9373	1.8949	.414	24.6332	Dummy Trap
797452	04-27-79	30725	HWFE	.08917	.5658	1.7350	.302	29.5781	Dummy Trap
797453	04-30-79	30745	FTP	.24071	.9370	1.8942	.497	24.5753	Dummy Trap
797454	04-30-79	30766	HWFE	.08770	.5553	1.7515	.330	29.7529	Dummy Trap
797629	05-01-79	30779	FTP	.25940	.9645	1.9236	.531	23.6558	Dummy Trap
797630	05-01-79	30800	HWFE	.09270	.5515	.9306*	.346	28.5026	Dummy Trap
797631	05-02-79	30813	FTP	.27772	.9342	1.9181	.528	23.9896	Dummy Trap
797632	05-02-79	30834	HWFE	.09586	.5640	1.8420	.355	28.6606	Dummy Trap
797637	05-04-79	30880	FTP	.30600	.9525	1.9469	.427	23.7590	Dummy Trap
797638	05-04-79	30890	HWFE	.09840	.5619	1.8238	.301	28.3411	Dummy Trap
797639	05-07-79	30921	FTP	.27162	.6931*	1.5205*	.420	31.4244*	Dummy Trap
797640	05-07-79	30942	HWFE	.10588	.5269	1.8893	.303	28.5022	Dummy Trap
MEAN (COUNT):			FTP	.27412(8)	.9271(9)	1.8689(9)	.486(8)	24.7653(9)	
STANDARD DEVIATION:				.02538	.0923	.1324	.055		

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* Questionable data

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   MEAN  (COUNT):                  HWFE     .09113(8)  .5588(9)  1.7028(9)  .332(9)  29.0453(9)
      STANDARD DEVIATION:                   .02070     .0155      .2934     .025

                                                     EMISSIONS (g/mi)
  TEST      TEST      ODOM     TEST     -----------------------------------------    F.E.
 NUMBER     DATE      (mi)     CYCLE       HC         CO        NOx        TP       (mpg)    TRAP TYPE/COMMENTS
 ------   --------   -----     ----     --------    ------    ------     -----     -------   --------------------------------

 797643   05-10-79   30983     FTP       .10615     .9266     1.9128     .213      24.0779   Texaco A-1R
 797644   05-10-79   31004     HWFE      .04061     .5602     1.8372     .133      29.1683   Texaco A-1R
 797647   05-11-79   31042     FTP       .11003     .8824     1.8950     .182      24.2533   Texaco A-1R
 797648   05-11-79   31063     HWFE      .05566     .5426     1.8469     .133      29.2503   Texaco A-1R
 797646   05-15-79   31203     HWFE      .07688     .5528     1.7781     .121      30.1082   Texaco A-1R
 797790   05-16-79   31282     HWFE      .06309     .5982     1.9414     .164      27.7278   Texaco A-1R
 797792   05-17-79   31316     FTP       .12335     .9327     1.9220     .203      23.9047   Texaco A-1R
 797793   05-17-79   31337     HWFE      .06017     .5822     1.9357     .151      28.0359   Texaco A-1R
 797795   05-18-79   31384     FTP       .13012     .8390     1.9023     .274      24.1959   Texaco A-1R
 797796   05-18-79   31404     HWFE      N/R        N/R        N/R       .173      29.5857   Texaco A-1R
 797798   05-21-79   31440     FTP       .15114     .9293     1.8870     .277      24.2994   Texaco A-1R
 797799   05-21-79   31457     HWFE      .05878     .5917     1.9062     .174      28.5861   Texaco A-1R
 797801   05-22-79   31501     FTP       .14106     .9742     1.9677     .297      23.7862   Texaco A-1R
 797802   05-22-79   31519     HWFE      .04430     .5487     1.8251     .189      30.0292   Texaco A-1R
 796946   05-23-79   31587     HWFE      .06476     .6205     1.8582     .187      28.3422   Texaco A-1R
 797030   06-05-79   31711     FTP       .16372     .9378     1.9719     .344      23.4565   Texaco A-1R
 797031   06-05-79   31733     HWFE      .07104     .6022     1.8537     .200      28.9063   Texaco A-1R
  none               31842     STEADY STATE                                                  REGENERATION
 797035   06-08-79   31901     FTP       .13622     .9140     1.9333     .221      24.1307   Texaco A-1R
 797869   06-08-79   31922     HWFE      .04742     .5581     1.8043     .140      29.3348   Texaco A-1R
  none    06-10-79   31962     STEADY STATE                                                  REGENERATION
 797871   06-11-79   31969     FTP       .16208     .9036     1.9542     .228      24.1269   Texaco A-1R
 797872   06-11-79   31983     HWFE      .05969     .5605     1.8685     .132      28.5097   Texaco A-1R
  none                         RECIRCULATING OVEN @ 925°F FOR 6.5 HOURS                      REGENERATION
 -------------------------     ----     -------     ------    ------     -----     -------
   MEAN  (COUNT):              FTP (9)   .13599     .9155     1.9274     .249      24.0229
      STANDARD DEVIATION:                .02081     .0382      .0314     .052

   MEAN  (COUNT):              HWFE     .05840(11) .5743(11) 1.8596(11) .158(12) 28.9477(12)
      STANDARD DEVIATION:               .01101     .0257      .0513     .027

                                                                                        Testing terminated due to inadequate
                                                                                        regeneration (only central core was
                                                                                        regenerated with throttling).

 *  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  4-10-79 THROUGH  6-26-79):
 *
 *     RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
 *
 *                             FTP       .4916      .9984     1.0244     .5210      .9731
 *
 *                             HWFE      .6118     1.0451     1.0778     .4744      .9858
 *
 *     Percent Change, that is  ( 1 - Ratio ) x 100 % :
 *
 *                             FTP      50.8%       0.2%      -2.4%     47.9%       2.7%
 *
 *                             HWFE     38.8%      -4.5%      -7.8%     52.6%       1.4%
 *
```

TEST NUMBER	TEST DATE	ODOM (mi)	TEST CYCLE	EMISSIONS (g/mi) HC	CO	NOx	TP	F.E. (mpg)	TRAP TYPE/COMMENTS
797874	06-12-79	32028	FTP	.25577	.9089	1.8692	.451	24.7543	Dummy Trap
797875	06-12-79	32048	HWFE	.09287	.5416	1.8996	.311	28.4241	Dummy Trap
797877	06-13-79	32078	FTP	.24743	.8620	1.9130	.411	25.0037	Dummy Trap
797878	06-13-79	32097	HWFE	.09720	.5251	1.6987	.319	31.4068	Dummy Trap
797880	06-15-79	32130	FTP	.28628	.9149	1.9489	.511	23.9335	Dummy Trap
797881	06-15-79	32150	HWFE	.10808	.5435	1.8244	.336	28.9866	Dummy Trap
797883	06-22-79	32220	FTP	.34540	.8988	1.9398	.506	24.2665	Dummy Trap
797884	06-22-79	32241	HWFE	.11592	.5063	1.6337	.359	31.5988	Dummy Trap
797888	06-26-79	32310	FTP	.26811	.9089	1.8506	.446	24.8124	Dummy Trap
797889	06-26-79	32330	HWFE	.09771	.5475	1.7739	.352	29.6644	Dummy Trap
MEAN (COUNT): STANDARD DEVIATION:			FTP (5)	.28060 .03906	.8987 .0213	1.9043 .0431	.465 .043	24.5477	
MEAN (COUNT): STANDARD DEVIATION:			HWFE(5)	.10236 .00942	.5328 .0171	1.7661 .1041	.335 .021	29.9616	
797893	07-02-79	32427	FTP	.02126	.0078	1.8879	.312	25.0073	Texaco A-1R w Engelhard CST-1 Coating
797894	07-02-79	32448	HWFE	N/R	.0000	N/R	.260	35.0949	Texaco A-1R w Engelhard CST-1 Coating
797896	07-03-79	32494	FTP	.02137	.0275	1.8948	.243	24.7020	Texaco A-1R w Engelhard CST-1 Coating
797897	07-03-79	32514	HWFE	.01050	.0000	1.7450	.200	30.0265	Texaco A-1R w Engelhard CST-1 Coating
798623	07-06-79	32603	FTP	.02185	.0338	1.8150	.278	24.9434	Texaco A-1R w Engelhard CST-1 Coating
798624	07-06-79	32624	HWFE	.00905	.0000	1.7239	.874	29.6767	Texaco A-1R w Engelhard CST-1 Coating
798621	07-09-79	32759	HWFE	.01317	.0000	1.5613	.938	32.4160	Texaco A-1R w Engelhard CST-1 Coating
798627	07-10-79	32832	HWFE	N/R	.0000	N/R	.971	37.7017	Texaco A-1R w Engelhard CST-1 Coating
798629	07-11-79	32893	FTP	.02661	.0334	1.8780	.265	24.4044	Texaco A-1R w Engelhard CST-1 Coating
798630	07-11-79	32914	HWFE	N/R	.0000	N/R	1.136	37.4207	Texaco A-1R w Engelhard CST-1 Coating
798632	07-12-79	32937	FTP	.02636	.0319	1.8845	.260	24.6408	Texaco A-1R w Engelhard CST-1 Coating
798633	07-12-79	32958	HWFE	N/R	.0000	1.8611	1.040	31.4167	Texaco A-1R w Engelhard CST-1 Coating
798635	07-13-79	33002	FTP	.05438	.0555	1.9286	.311	24.5739	Texaco A-1R w Engelhard CST-1 Coating
798636	07-13-79	33022	HWFE	N/R	.0000	N/R	1.094	29.5889	Texaco A-1R w Engelhard CST-1 Coating
798638	07-16-79	33102	FTP	.04899	.0260	1.7992	.329	25.2482	Texaco A-1R w Engelhard CST-1 Coating
798639	07-16-79	33123	HWFE	N/R	.0000	1.7292	1.060	28.9995	Texaco A-1R w Engelhard CST-1 Coating
798641	07-17-79	33140	FTP	.03572	.0552	1.8010	.315	25.5009	Texaco A-1R w Engelhard CST-1 Coating
798642	07-17-79	33160	HWFE	N/R	.0010	1.6850	1.002	31.3807	Texaco A-1R w Engelhard CST-1 Coating
798642+	07-17-79	33160	HWFE	N/R	.0000	1.6430	N/R	31.3385	Texaco A-1R w Engelhard CST-1 Coating
798644	07-19-79	33299	FTP	N/R	.0349	1.6893	.253	27.2091*	Texaco A-1R w Engelhard CST-1 Coating
798649	07-20-79	33353	HWFE	N/R	.0000	1.4440	1.200	34.5386	Texaco A-1R w Engelhard CST-1 Coating
798649+	07-20-79	33353	HWFE	N/R	.0000	1.4850	.950	33.2896	Texaco A-1R w Engelhard CST-1 Coating
MEAN (COUNT): STANDARD DEVIATION:			FTP	.03207(8) .01307	.0340(9) .0146	1.8420(9) .0734	.285(9) .032	25.1124(9)	
MEAN (COUNT): STANDARD DEVIATION:			HWFE	.01091(3) .00209	.0001(13) .0003	1.6531(9) .1342	.894(12) .323	32.3008(13)	

```
*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  6-12-79 THROUGH  8- 1-79):
*
*     RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                          FTP      .1155      .0379      .9811      .5892     1.0101
*
*                          HWFE     .1055      .0002      .9548     2.6359     1.0656
*
*     Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                          FTP      88.4%      96.2%      1.9%      41.1%      -1.0%
*
*                          HWFE     89.4%      99.98%     4.5%    -163.6%      -6.6%

TEST     TEST      ODOM    TEST            EMISSIONS (g/mi)
NUMBER   DATE      (mi)    CYCLE   ----------------------------------------   F.E.
------  --------   -----   ----      HC        CO       NOx       TP         (mpg)    TRAP TYPE/COMMENTS
                                   -------   ------    ------    -----      -------   -------------------------------
798933  08-01-79   33524   FTP      .26343    .8837    1.7439    .577      26.5641   Dummy Trap
798934  08-01-79   33544   HWFE     .10893    .5289    1.5575    .360      32.1971   Dummy Trap
---------------------------  ----  -------   ------    ------    -----     -------
  MEAN  (COUNT):           FTP (1)  .26343    .8837    1.7439    .577      26.5641

  MEAN  (COUNT):           HWFE(1)  .10893    .5289    1.5575    .360      32.1971


798936  08-02-79   33587   FTP      .31260    .8546    1.7350    .288      26.6955   ICI Saffil
798937  08-02-79   33608   HWFE     .09020    .4993    1.5193    .280      33.2603   ICI Saffil
798939  08-03-79   33636   FTP      .24856    .7915    1.7506    .351      26.5080   ICI Saffil
798940  08-03-79   33656   HWFE      N/R      .4910    1.6070    .197      31.9645   ICI Saffil
798941  08-09-79   33987   HWFE      N/R      .5310    1.6860    .238      31.0015   ICI Saffil
798942  08-10-79   34112   FTP      .21387    .8123    1.7135    .303      27.0058   ICI Saffil
798946  08-16-79   34281   FTP       N/R      .7603    1.9395    .606      23.9788   ICI Saffil
798947  08-16-79   34302   HWFE      N/R      .5330    1.7810    .615      28.8167   ICI Saffil
 none                      STEADY STATE                                             REGENERATION
798948  08-22-79   34410   FTP       N/R      .8303    1.8350    .350      24.6696   ICI Saffil
798949  08-22-79   34430   HWFE      N/R      .5520    1.6900    .202      30.1568   ICI Saffil
798950  08-24-79   34464   FTP      .22490    .9047    1.8405    .406      24.1727   ICI Saffil
798951  08-24-79   34484   HWFE     .07400    .5400    1.6750    .224      30.1209   ICI Saffil
798952  08-30-79   34762   FTP      .23868    .8294    1.9844    .477      23.3990   ICI Saffil
798953  08-30-79   34782   HWFE     .08700    .5270    1.7750    .313      29.3039   ICI Saffil
 none                      STEADY STATE                                             REGENERATION
798954  08-31-79   34877   HWFE      N/R      .5440    1.7870    .246      28.9156   ICI Saffil
798955  09-05-79   34910   FTP       N/R      .8983    2.0067    .296      23.6871   ICI Saffil
---------------------------  ----  -------   ------    ------    -----     -------
  MEAN  (COUNT):           FTP     .24772(5) .8352(8) 1.8506(8) .385(8)  24.9395(8)
    STANDARD DEVIATION:            .03860    .0497     .1151    .110

  MEAN  (COUNT):           HWFE    .08373(3) .5272(8) 1.6900(8) .289(8)  30.3748(8)
    STANDARD DEVIATION:            .00858    .0214     .0935    .137
```

```
*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  8- 1-79 THROUGH 10-16-79):
*
*      RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                               FTP      .9497      .9231      .9696      .7925      1.0031
*
*                               HWFE     .8611      .9827      .9643      .8216      1.0021
*
*      Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                               FTP      5.0%       7.7%       4.0%      20.7%       -0.3%
*
*                               HWFE    13.9%       1.7%       3.6%      17.8%       -0.2%
*

                                              EMISSIONS (g/mi)
TEST      TEST      ODOM     TEST    -----------------------------------     F.E.
NUMBER    DATE      (mi)     CYCLE      HC        CO       NOx      TP       (mpg)    TRAP TYPE/COMMENTS
------  --------   -----     ----    -------    ------    ------   -----    -------   ---------------------------------

798956  09-19-79   34941     FTP     .14236     .7621    1.8417    .078     25.4088   Corning EX-40
798957  09-19-79   34962     HWFE    .07383     .4401    1.6316    .074     31.7207   Corning EX-40
 ---------------------       ----    -------    ------    ------   -----    -------
  MEAN  (COUNT):             FTP (1) .14236     .7621    1.8417    .078     25.4088

  MEAN  (COUNT):             HWFE(1) .07383     .4401    1.6316    .074     31.7207

                                                                                      Testing terminated due to high EGBP.

*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  8- 1-79 THROUGH 10-16-79):
*
*      RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                               FTP      .5458      .8423      .9730      .1606      1.0554
*
*                               HWFE     .7593      .8204      .9309      .2104      1.0760
*
*      Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                               FTP     45.4%      15.8%       2.7%      83.9%       -5.5%
*
*                               HWFE    24.1%      18.0%       6.9%      79.0%       -7.6%
*


798959  09-26-79   35004     FTP     .23029     .8881    2.0535    .049     22.7168   BALSTON FILTER
798960  09-26-79   35027     HWFE    .08500     .5180    1.8280    .210     28.3144   BALSTON FILTER
799469  10-04-79   35061     FTP     .24870     .8670    1.9498    .338     23.3941   BALSTON FILTER
799470  10-04-79   35085     HWFE    .09414     .5350    1.7667    .320     29.1574   BALSTON FILTER
 ---------------------       ----    -------    ------    ------   -----    -------
  MEAN  (COUNT):             FTP (2) .23950     .8776    2.0016    .194     23.0505
     STANDARD DEVIATION:             .01302     .0149     .0733    .204

  MEAN  (COUNT):             HWFE(2) .08957     .5265    1.7974    .265     28.7299
     STANDARD DEVIATION:             .00646     .0120     .0433    .078
                                                                                      Testing terminated due to failure of one
                                                                                      of the seven trapping elements.
```

```
*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  8- 1-79 THROUGH 10-16-79):
*
*      RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                              FTP      .9182       .9699      1.0575      .3983       .9574
*
*                              HWFE     .9212       .9814      1.0255      .7534       .9745
*
*      Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                              FTP      8.2%        3.0%       -5.8%      60.2%        4.3%
*
*                              HWFE     7.9%        1.9%       -2.6%      24.7%        2.5%
*

                                               EMISSIONS (g/mi)
TEST      TEST      ODOM    TEST    -----------------------------------------      F.E.
NUMBER    DATE      (mi)    CYCLE      HC         CO        NOx       TP          (mpg)    TRAP TYPE/COMMENTS
------  --------   -----    ----    -------     ------     ------    -----      -------    --------------------------------

799471  10-11-79   35105    FTP      .30883      .9336     1.9554     .479      23.4320    Dummy Trap
799472  10-12-79   35131    FTP      .30135      .9090     1.9205     .460      23.8193    Dummy Trap
799473  10-12-79   35152    HWFE     .10300      .5320     1.8020     .356      29.1344    Dummy Trap
799474  10-15-79   35177    FTP      .21223      .8868     1.9333     .472      23.4526    Dummy Trap
799475  10-15-79   35188    HWFE     .09500      .5320     1.8220     .350      28.5961    Dummy Trap
799477  10-16-79   35252    FTP      .21836      .9104     1.9113     .442      23.3957    Dummy Trap
799478  10-16-79   35273    HWFE     .08200      .5530     1.8290     .340      28.3065    Dummy Trap
----------------------              ----    -------     ------     ------    -----      -------
  MEAN  (COUNT):                   FTP (4)  .26019      .9100     1.9301     .463      23.5239
     STANDARD DEVIATION:                     .05199      .0191      .0191     .016

  MEAN  (COUNT):                   HWFE(3)  .09333      .5390     1.8177     .349      28.6747
     STANDARD DEVIATION:                     .01060      .0121      .0140     .008


799476  10-15-79   35227    STEADY STATE                                                      Baseline -- REGENERATION
799479  10-16-79   35307    STEADY STATE                                                      Baseline -- REGENERATION

799480  10-19-79   35433    STEADY STATE                                                      ICI Saffil -- REGENERATION
 NONE   10-23-79   35527    STEADY STATE                                                      ICI Saffil --  REGENERATION ATTEMPTED
799483  10-25-79   35790    STEADY STATE                                                      ICI Saffil -- REGENERATION
                                                                                              Test sequence to determine relative
                                                                                              emissions during the regeneration
                                                                                              process.  (See Appendix B.)


799481  10-31-79   35826    FTP      .00782      .0096     1.9224     .249      24.0071    Texaco A-1R w Engelhard CST-1 Coating #2
799482  10-31-79   35850    HWFE     .11000      .0020     1.8110     .853      28.7544    Texaco A-1R w Engelhard CST-1 Coating #2
799484  11-01-79   35898    FTP      .02400      .0199     1.8960     .220      24.8227    Texaco A-1R w Engelhard CST-1 Coating #2
799485  11-01-79   35920    HWFE     .05600     -.0040     1.7760     .896      29.7270    Texaco A-1R w Engelhard CST-1 Coating #2
----------------------              ----    -------     ------     ------    -----      -------
  MEAN  (COUNT):                   FTP (2)  .01591      .0148     1.9092     .234      24.4081
     STANDARD DEVIATION:                     .01144      .0073      .0187     .021

  MEAN  (COUNT):                   HWFE(2)  .08300      .0010     1.7935     .874      29.2329
     STANDARD DEVIATION:                     .03818      .0014      .0247     .030
```

```
*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM 10-11-79 THROUGH 10-16-79):
*
*     RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                                  FTP     .0611      .0163      .9892     .5054     1.0376
*
*                                  HWFE    .8843      .0019      .9867    2.5043     1.0195
*
*     Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                                  FTP     93.9%      98.4%       1.1%     49.5%      -3.8%
*
*                                  HWFE    11.1%      99.8%       1.3%   -150.4%      -1.9%
*


                                                                                   2,000 miles accumulated       |
                                                                                                                \|/
                                                                                                                 v
                                                      EMISSIONS (g/mi)
TEST      TEST      ODOM    TEST     --------------------------------------------        F.E.
NUMBER    DATE      (mi)    CYCLE      HC        CO         NOx         TP               (mpg)     TRAP TYPE/COMMENTS
------  --------    -----   ----     -------   ------     ------      -----             -------    --------------------------------

799486  01-10-80   37954    FTP     1.37300*    .1668     1.8195       .517*            25.0364    Texaco A-1R w Engelhard CST-1 Coating #2
799487  01-10-80   37974    HWFE     .30500     .0000     1.6520       .562             30.1726    Texaco A-1R w Engelhard CST-1 Coating #2
799488  01-15-80   38030    FTP      .18833     .2162     1.8188       .372             22.1924    Texaco A-1R w Engelhard CST-1 Coating #2
799490  01-15-80   38042    HWFE     .00100     .0000     1.7030       .888             30.6885    Texaco A-1R w Engelhard CST-1 Coating #2
---------------------------          -------   ------     ------      -----             -------
  MEAN  (COUNT):            FTP (2)  .78066     .1915     1.8192       .444             23.5289
     STANDARD DEVIATION:             .83769     .0349      .0005       .103

  MEAN  (COUNT):            HWFE(2)  .15300     .0000     1.6775       .725             30.4284
     STANDARD DEVIATION:             .21496     .0000      .0361       .231


*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  1-17-80 THROUGH  1-18-80):
*
*     RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                                  FTP    2.3289      .2058     1.0117      .9569      .9169
*
*                                  HWFE   1.5455      .0000     1.0081     2.0139      .9648
*
*     Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                                  FTP   -132.9%      79.4%      -1.2%      4.3%       8.3%
*
*                                  HWFE   -54.6%     100.0%      -0.8%   -101.4%       3.5%
*
```

```
                                                 EMISSIONS (g/mi)
TEST     TEST      ODOM    TEST     -----------------------------------------      F.E.
NUMBER   DATE      (mi)    CYCLE       HC         CO         NOx        TP         (mpg)     TRAP TYPE/COMMENTS
------  --------   -----   ----     -------     ------     ------     -----       -------   --------------------------------

799491  01-17-80   38087   FTP        N/R        .9103      1.7673      .480       26.1133   Dummy Trap
799492  01-17-80   38108   HWFE       N/R        .5930      1.6890      .379       31.1792   Dummy Trap
799493  01-18-80   38132   FTP       .33521      .9510      1.8290      .447       25.2256   Dummy Trap
799494  01-18-80   38153   HWFE      .09900      .5140      1.6390      .342       31.9093   Dummy Trap
  ----------------------   ----     -------     ------     ------     -----       -------
  MEAN  (COUNT):           FTP       .33521(1)  .9306(2)   1.7982(2)  .464(2)    25.6621(2)
     STANDARD DEVIATION:              N/A       .0288       .0436     .023

  MEAN  (COUNT):           HWFE      .09900(1)  .5535(2)   1.6640(2)  .360(2)    31.5398(2)
     STANDARD DEVIATION:              N/A       .0559       .0354     .026


799495  01-29-80   38205   FTP       .26665      .9014      1.9643      .121       24.2807   Corning EX-47 6" non-catalyzed
799496  01-29-80   38218   HWFE      .07100      .5140      1.8300      .131       29.0773   Corning EX-47 6" non-catalyzed
799497  01-30-80   38265   FTP       .22274      .9142      2.0427      .172       23.8886   Corning EX-47 6" non-catalyzed
  ----------------------   ----     -------     ------     ------     -----       -------
  MEAN  (COUNT):           FTP (2)   .24470      .9078      2.0035      .146       24.0830
     STANDARD DEVIATION:             .03105      .0091       .0554      .036

  MEAN  (COUNT):           HWFE(1)   .07100      .5140      1.8300      .131       29.0773

*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  1-17-80 THROUGH  1-18-80):
*
*      RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                          FTP       .7300       .9755      1.1142      .3147       .9385
*
*                          HWFE      .7172       .9286      1.0998      .3639       .9219
*
*      Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                          FTP       27.0%       2.4%       -11.4%      68.5%       6.2%
*
*                          HWFE      28.3%       7.1%       -10.0%      63.6%       7.8%
*

801739  01-31-80   38289   FTP       .15769      .4735      1.8834      .109       25.7561   Corning EX-47 6" w Engelhard CST-1 Coating
801463  01-31-80   38298   HWFE      .05000      .0350      1.8410      .312       29.0483   Corning EX-47 6" w Engelhard CST-1 Coating
798961  02-01-80   38349   FTP       .08895      .2510      1.8403      .128       24.8488   Corning EX-47 6" w Engelhard CST-1 Coating
799468  02-01-80   38360   HWFE      .00200      .0200      1.6820      .497       31.0822   Corning EX-47 6" w Engelhard CST-1 Coating
 none   02-01-80           STEADY STATE                                                     UNSUCCESSFUL REGENERATION
  ----------------------   ----     -------     ------     ------     -----       -------
  MEAN  (COUNT):           FTP (2)   .12332      .3622      1.8618      .118       25.2940
     STANDARD DEVIATION:             .04861      .1573       .0305      .013

  MEAN  (COUNT):           HWFE(2)   .02600      .0275      1.7615      .404       30.0309
     STANDARD DEVIATION:             .03394      .0106       .1124      .131
```

* EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM 1-17-80 THROUGH 1-18-80):

RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:

FTP	.3679	.3892	1.0354	.2543	.9857
HWFE	.2626	.0497	1.0586	1.1222	.9522

Percent Change, that is (1 - Ratio) x 100 % :

FTP	63.2%	61.1%	-3.5%	74.6%	1.4%
HWFE	73.7%	95.0%	-5.9%	-12.2%	4.8%

TEST NUMBER	TEST DATE	ODOM (mi)	TEST CYCLE	EMISSIONS (g/mi) HC	CO	NOx	TP	F.E. (mpg)	TRAP TYPE/COMMENTS
801464	02-12-80	38429	FTP	.28587	.9080	1.7322	.110	26.9074	Corning EX-47 12" non-catalyzed
801465	02-12-80	38440	HWFE	.09100	.5220	1.6090	.091	31.9833	Corning EX-47 12" non-catalyzed
801466	02-14-80	38491	FTP	N/R	.9112	1.7259	.114	26.8053	Corning EX-47 12" non-catalyzed
801467	02-14-80	38504	HWFE	N/R	.5340	1.6710	.184	31.5125	Corning EX-47 12" non-catalyzed
801468	02-15-80	38543	FTP	N/R	.9103	1.7941	.105	25.7925	Corning EX-47 12" non-catalyzed
801469	02-15-80	38566	HWFE	N/R	.5110	1.7070	.095	30.6842	Corning EX-47 12" non-catalyzed
801470	02-22-80	38622	FTP	N/R	.8644	1.7095	.129	26.8103	Corning EX-47 12" non-catalyzed
801471	02-22-80	38633	HWFE	N/R	N/R	N/R	.096	N/R	Corning EX-47 12" non-catalyzed
none			STEADY STATE						REGENERATION
801472	02-27-80	38735	FTP	N/R	.8971	1.7094	.086	27.1632	Corning EX-47 12" non-catalyzed
801473	02-27-80	38755	HWFE	N/R	N/R	N/R	.077	N/R	Corning EX-47 12" non-catalyzed
801474	02-28-80	38787	FTP	N/R	.8794	1.7698	.107	25.9227	Corning EX-47 12" non-catalyzed
801730	02-28-80	38807	HWFE	N/R	.5120	1.7750	.092	29.8238	Corning EX-47 12" non-catalyzed
801731	02-29-80	38837	FTP	N/R	.8774	1.8183	.113	25.3441	Corning EX-47 12" non-catalyzed
801732	02-29-80	38851	HWFE	N/R	.5210	1.8240	.097	28.6993	Corning EX-47 12" non-catalyzed
none	02-29-80		STEADY STATE						REGENERATION
801733	03-12-80	38917	FTP	N/R	.9994	1.8801	.102	24.3600	Corning EX-47 12" non-catalyzed
801737	03-13-80	38985	FTP	N/R	.9856	1.8533	.108	24.2421	Corning EX-47 12" non-catalyzed
801979	03-27-80	39246	FTP	.17424	.9376	1.9852	.274	22.6712	Corning EX-47 12" non-catalyzed
801987	04-02-80	39310	FTP	N/R	.9359	1.8778	.465	23.0961	Corning EX-47 12" non-catalyzed
802070	04-08-80	39363	STEADY STATE						REGENERATION
802071	04-09-80	39420	FTP	N/R	.9510	1.6770	.178	25.8463	Corning EX-47 12" non-catalyzed
802072	04-10-80	39433	FTP	N/R	.9695	1.8003	.233	24.6623	Corning EX-47 12" non-catalyzed
802074	04-11-80	39465	HWFE	N/R	.5665	1.7174	.205	29.0841	Corning EX-47 12" non-catalyzed
802081	04-15-80	39517	HWFE	N/R	.5196	1.4680	.116	33.6024	Corning EX-47 12" non-catalyzed
802079	04-16-80	39567	HWFE	N/R	.5689	1.6203	.127	30.8460	Corning EX-47 12" non-catalyzed
MEAN (COUNT):			FTP	.23006(2)	.9251(13)	1.7948(13)	.163(13)	25.2755(13)	
STANDARD DEVIATION:				.07893	.0426	.0876	.107		
MEAN (COUNT):			HWFE	.09100(1)	.5319(8)	1.6740(8)	.118(10)	30.7069(8)	
STANDARD DEVIATION:				N/A	.0232	.1103	.043		

```
*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  1-17-80 THROUGH 10- 2-80):
*
*     RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                            FTP      .8640     1.0376      .9538     .3581     1.0397
*
*                            HWFE     .9866     1.2502     1.0076     .3615      .9876
*
*     Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                            FTP     13.6%      -3.8%       4.6%     64.1%      -4.0%
*
*                            HWFE     1.3%     -25.0%      -0.8%     63.8%       1.2%


TEST     TEST      ODOM   TEST               EMISSIONS (g/mi)
NUMBER   DATE      (mi)   CYCLE   -----------------------------------         F.E.
------  --------  -----   ----      HC        CO         NOx       TP        (mpg)    TRAP TYPE/COMMENTS
                                 -------    ------     ------     -----     -------   ---------------------------------

802089  09-24-80  39746   FTP     .25559     .9096     2.0111      .466     22.7109   Dummy Trap
802090  09-24-80  39759   HWFE    .08606     .4704     1.6364      .297     30.4779   Dummy Trap
802093  09-25-80  39796   FTP     .22429     .7732     1.9025      .440     23.9571   Dummy Trap
802094  09-25-80  39811   HWFE    .08864     .0462     1.6855      .305     30.5381   Dummy Trap
802097  10-02-80  39865   FTP     .25003     .9140     1.8984      .437     23.8279   Dummy Trap
806296  10-02-80  39878   HWFE    .09525     .5036     1.6569      .310     31.4106   Dummy Trap
----------------------    ----   -------    ------     ------     -----     -------
  MEAN  (COUNT):          FTP (3) .24330     .8656     1.9373      .448     23.4852
     STANDARD DEVIATION:          .01670     .0801      .0639      .016

  MEAN  (COUNT):          HWFE(3) .08998     .3401     1.6596      .304     30.8034
     STANDARD DEVIATION:          .00474     .2550      .0247      .007


806543  10-23-80  39977   HWFE    .08398     .5677     1.7954      .172     28.6632   ICI Saffil fourth generation
806548  10-28-80  40036   HWFE    .07364     .5411     1.7617      .204     30.7475   ICI Saffil fourth generation
806553  02-26-81  40664   HWFE    .06511     .6033     1.8042      .327     29.5797   ICI Saffil fourth generation
806552  03-04-81  40694   HWFE    .16804     .6341     2.0497      .335     27.4002   ICI Saffil fourth generation
807882  03-06-81  40746   FTP     .24406    1.0734     2.0956      .545     21.6846   ICI Saffil fourth generation
807883  03-06-81  40767   HWFE    .08749     .5623     1.9021      .336     27.7262   ICI Saffil fourth generation
807886  03-10-81  40811   FTP     .32480    1.1537     2.0441     1.419*    21.7132   ICI Saffil fourth generation
807889  04-02-81  41126   FTP     .32198    1.0848     2.0639      .533     22.3383   ICI Saffil fourth generation
807890  04-02-81  41136   HWFE    .11203     .6043     1.8766      .339     28.2538   ICI Saffil fourth generation
807892  04-08-81  41333   FTP     .31474    1.0813     2.1354      .569     22.0491   ICI Saffil fourth generation
807893  04-08-81  41344   HWFE    .10152     .5807     1.8996      .366     28.0258   ICI Saffil fourth generation
807894  04-08-81  41375   HWFE    .08552     .5960     1.9040      .327     27.8745   ICI Saffil fourth generation
----------------------    ----   -------    ------     ------     -----     -------
  MEAN  (COUNT):          FTP (4) .30140    1.0983     2.0848      .766     21.9428
     STANDARD DEVIATION:          .03846     .0372      .0399      .435

  MEAN  (COUNT):          HWFE(8) .09717     .5862     1.8742      .301     28.4973
     STANDARD DEVIATION:          .03218     .0292      .0901      .071
                                                                                      Testing terminated due to insufficient
                                                                                      trapping efficiency.
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*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  9-24-80 THROUGH  4-16-81):
*
*      RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                          FTP     1.1395     1.1602     1.0480     1.4938      .9569
*
*                          HWFE    1.0217     1.3261     1.0714      .8980      .9596
*
*      Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                          FTP    -14.0%     -16.0%      -4.8%     -49.4%       4.3%
*
*                          HWFE    -2.2%     -32.6%      -7.1%      10.2%       4.0%

TEST      TEST      ODOM    TEST              EMISSIONS (g/mi)
NUMBER    DATE      (mi)    CYCLE   ----------------------------------------   F.E.
------  --------   -----    ----      HC        CO        NOx       TP        (mpg)     TRAP TYPE/COMMENTS
                                    -------   ------    ------    -----      -------   ------------------------------
807898  04-15-81   41455    FTP      .31280   1.0573    2.0670     .648      21.9558   Dummy Trap
807899  04-15-81   41475    HWFE     .10621    .5960    1.8977     .388      28.2563   Dummy Trap
808687  04-16-81   41494    FTP      .27976   1.0791    2.0674     .571      22.3448   Dummy Trap
808688  04-16-81   41504    HWFE     .09940    .5941    1.8702     .377      28.1022   Dummy Trap
---------------------------          -------  ------    ------    -----      -------
  MEAN  (COUNT):            FTP (2)  .29628   1.0682    2.0672     .610      22.1484
     STANDARD DEVIATION:             .02336    .0154     .0003     .054

  MEAN  (COUNT):            HWFE(2)  .10280    .5950    1.8840     .382      28.1793
     STANDARD DEVIATION:             .00482    .0013     .0194     .008


808690  04-17-81   41544    FTP      .11478    .1102    2.0743     .278      22.1526   Corning EX-47 12" w UOP Coating
808691  04-17-81   41552    HWFE     .01287    .0000    1.8433    1.071      28.3532   Corning EX-47 12" w UOP Coating
808740  04-21-81   41606    HWFE     .03256    .0000    1.8616    1.160      27.8063   Corning EX-47 12" w UOP Coating
808739  04-22-81   41625    FTP      .08400    .1153    2.0505     .352      22.4502   Corning EX-47 12" w UOP Coating
---------------------------  ----    -------  ------    ------    -----      -------
  MEAN  (COUNT):            FTP (2)  .09939    .1127    2.0624     .315      22.3005
     STANDARD DEVIATION:             .02176    .0036     .0168     .052

  MEAN  (COUNT):            HWFE(2)  .02272    .0000    1.8524    1.116      28.0773
     STANDARD DEVIATION:             .01392    .0000     .0129     .063
                                                                                       Testing suspended due to question of
                                                                                       whether vehicle is stable.
*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  4-15-81 THROUGH  8- 6-81):
*
*      RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                          FTP      .3824      .1150     1.0010      .5912      .9879
*
*                          HWFE     .2062      .0000     1.0377     2.9715      .9888
*
*      Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                          FTP     61.8%      88.5%      -0.1%      40.9%       1.2%
*
*                          HWFE    79.4%     100.0%      -3.8%    -197.1%       1.1%
```

TEST NUMBER	TEST DATE	ODOM (mi)	TEST CYCLE	EMISSIONS (g/mi)				F.E. (mpg)	TRAP TYPE/COMMENTS
				HC	CO	NOx	TP		
808744	04-28-81	41687	FTP	.28905	.9238	2.1493	.492	22.5037	Dummy Trap
808745	04-28-81	41701	HWFE	.11968	.5436	1.7758	.391	28.4965	Dummy Trap
808747	04-29-81	41728	FTP	.29025	.8899	2.0740	.491	22.4566	Dummy Trap
808748	04-29-81	41738	HWFE	.11401	.5233	1.7676	.358	28.3420	Dummy Trap
808750	05-05-81	41787	FTP	.29302	.9507	2.0585	.527	22.7017	Dummy Trap
808751	05-05-81	41807	HWFE	.11826	.5695	1.7760	.357	28.1005	Dummy Trap
809067	07-29-81	41834	FTP	.05667*	.9867	2.1268	N/R	22.2888	Dummy Trap
809068	07-29-81	41855	HWFE	.11059	.5610	1.8147	N/R	27.9490	Dummy Trap
809071	08-05-81	41911	FTP	.27450	.9714	1.9552	.489	23.1682	Dummy Trap
809072	08-05-81	41932	HWFE	.10274	.5844	1.6642	.372	29.0654	Dummy Trap
809075	08-06-81	41960	FTP	.28308	.9826	1.9848	.511	23.2185	Dummy Trap
809076	08-06-81	41981	HWFE	.11055	.5812	1.7147	.388	28.8986	Dummy Trap
MEAN (COUNT):			FTP	.24776(6)	.9508(6)	2.0581(6)	.502(5)	22.7175(6)	
STANDARD DEVIATION:				.09385	.0378	.0765	.016		
MEAN (COUNT):			HWFE	.11264(6)	.5605(6)	1.7522(6)	.373(5)	28.4698(6)	
STANDARD DEVIATION:				.00616	.0235	.0537	.016		
810401	09-01-81	42036	FTP	.11023	.3076	2.0138	.245	23.3040	Corning EX-47 12" w UOP Coating
810402	09-01-81	42065	HWFE	.02442	.0507	1.8300	.453	29.4085	Corning EX-47 12" w UOP Coating
810404	09-03-81	42104	FTP	.14042	.2757	1.9635	.332	22.3305	Corning EX-47 12" w UOP Coating
810405	09-03-81	42116	HWFE	.01907	.0361	1.6911	.566	28.1124	Corning EX-47 12" w UOP Coating
810407	09-09-81	42159	FTP	.10008	.2434	1.9717	.259	23.3112	Corning EX-47 12" w UOP Coating
810779	09-15-81	42205	HWFE	.00762	.0219	1.7136	.436	28.6712	Corning EX-47 12" w UOP Coating
810784	09-24-81	42327	FTP	.03000	.1864	1.9685	.197	22.7543	Corning EX-47 12" w UOP Coating
810785	09-24-81	42342	HWFE	.00556	.0147	1.7196	.631	28.3533	Corning EX-47 12" w UOP Coating
810790	09-30-81	42381	FTP	.07481	.1948	2.0132	.274	22.4454	Corning EX-47 12" w UOP Coating
810791	10-01-81	42396	HWFE	.01446	.0215	1.7616	.631	27.9608	Corning EX-47 12" w UOP Coating
810787	10-09-81	42458	STEADY STATE						REGENERATION
810788	10-15-81	42465	FTP	.09844	.3476	1.9016	.282	23.2494	Corning EX-47 12" w UOP Coating
810789	10-15-81	42481	HWFE	.01617	.1017	1.7686	.633	28.4189	Corning EX-47 12" w UOP Coating
811167	10-20-81	42532	FTP	.06770	.2073	2.0266	.249	22.3962	Corning EX-47 12" w UOP Coating
811168	10-20-81	42542	HWFE	.01197	.0145	1.8364	.804	27.8095	Corning EX-47 12" w UOP Coating
811170	10-21-81	42619	STEADY STATE						REGENERATION
811271	10-27-81	42708	HWFE	.02329	.0291	1.6961	.645	28.5858	Corning EX-47 12" w UOP Coating
811273	10-29-81	42802	FTP	.10971	.3579	1.9589	.493	23.4070	Corning EX-47 12" w UOP Coating
MEAN (COUNT):			FTP (8)	.09142	.2651	1.9772	.291	22.8917	
STANDARD DEVIATION:				.03343	.0679	.0404	.090		
MEAN (COUNT):			HWFE(8)	.01532	.0363	1.7521	.600	28.4075	
STANDARD DEVIATION:				.00684	.0290	.0572	.117		

Testing terminated due to radial crack
2/3 way down trap.

```
*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  4-28-81 THROUGH 11-17-81):
*
*      RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                                  FTP       .3642       .2822       .9702      .5948      1.0005
*
*                                  HWFE      .1436       .0657       .9978     1.6655       .9949
*
*      Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                                  FTP      63.6%       72.8%        3.0%      40.5%       -0.1%
*
*                                  HWFE     85.6%       93.4%        0.2%     -66.6%        0.5%

                                               EMISSIONS (g/mi)
TEST      TEST       ODOM    TEST      ---------------------------------------
NUMBER    DATE       (mi)    CYCLE       HC         CO        NOx       TP       F.E.
------    --------   -----   ----      -------    ------    ------    -----     (mpg)     TRAP TYPE/COMMENTS
                                                                                -------   ------------------------------

811274   11-10-81   42839   FTP        .24975     .9307    1.9580     .502     23.3885   Dummy Trap
811275   11-10-81   42849   HWFE       .09128     .5311    1.7109     .346     28.7469   Dummy Trap
811277   11-12-81   42888   FTP        .25987     .8883    2.0316     .448     22.9682   Dummy Trap
811278   11-12-81   42899   HWFE       .09170     .5327    1.8162     .341     28.5051   Dummy Trap
811280   11-17-81   42937   FTP        .26283     .9303    2.0039     .455     23.2794   Dummy Trap
811281   11-17-81   42948   HWFE       .10115     .5492    1.7630     .329     28.9054   Dummy Trap
-------------------------           ----       -------    ------    ------    -----     -------
  MEAN  (COUNT):                    FTP (3)    .25748     .9164    1.9978     .468     23.2105
     STANDARD DEVIATION:                       .00686     .0244     .0372     .029

  MEAN  (COUNT):                    HWFE(3)    .09471     .5377    1.7634     .339     28.7183
     STANDARD DEVIATION:                       .00558     .0100     .0527     .009

811617   11-25-81   42989   FTP        .22543     .9172    2.0467     .065     23.5563   NGK #2
811618   11-25-81   43004   HWFE       .07731     .5150    1.8273     .055     28.9159   NGK #2
811620   12-01-81   43045   FTP        .21110     .8418    1.8357     .069     24.8297   NGK #2
811621   12-01-81   43059   HWFE       .05556     .4925    1.7006     .051     29.0897   NGK #2
811623   12-02-81   43091   FTP        .17174     .9006    1.9080     .076     24.8923   NGK #2
811624   12-02-81   43107   HWFE       .04629     .4547    1.6543     .053     31.9260   NGK #2
811626   12-09-81   43202   FTP        .14880     .8705    2.0084     .062     22.1381   NGK #2
811762   12-09-81   43215   HWFE       .04778     .4684    1.8342     .061     27.7469   NGK #2
811764   12-09-81   43264   STEADY STATE                                               REGENERATION
811765   12-10-81   43281   FTP        .12539     .8514    2.0077     .049     22.9416   NGK #2
811766   12-10-81   43294   HWFE       .03666     .4561    1.7915     .034     28.2124   NGK #2
811768   12-11-81   43335   FTP        .09947     .8498    1.9680     .055     22.9977   NGK #2
811815   12-11-81   43338   HWFE       .03259     .4402    1.7176     .036     28.8552   NGK #2
811816   12-16-81   43374   STEADY STATE                                               REGENERATION
811817   12-17-81   43397   FTP        .10905     .8667    1.9643     .058     23.0468   NGK #2
811818   12-17-81   43410   HWFE       .03871     .4445    1.7493     .024     28.9350   NGK #2
811820   12-22-81   43494   FTP        .18491     .9166    2.0677     .065     22.0332   NGK #2
811821   12-22-81   43507   HWFE       .04120     .4349    1.8752     .037     27.3792   NGK #2
811823   12-23-81   43547   STEADY STATE                                               UNSUCCESSFUL REGENERATION
811824   01-06-82   43590   STEADY STATE                                               REGENERATION
 none    01-20-82   43819   STEADY STATE                                               REGENERATION
-------------------------           ----       -------    ------    ------    -----     -------
  MEAN  (COUNT):                    FTP (8)    .15949     .8768    1.9758     .062     23.2612
     STANDARD DEVIATION:                       .04665     .0305     .0756     .008

  MEAN  (COUNT):                    HWFE(8)    .04701     .4633    1.7688     .044     28.8284
     STANDARD DEVIATION:                       .01419     .0277     .0759     .013
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*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM 11-10-81 THROUGH 11-17-81):
*
*     RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                               FTP      .6194      .9568      .9890     .1325     1.0022
*
*                               HWFE     .4964      .8616     1.0031     .1298     1.0038
*
*     Fercent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                               FTP     38.1%        4.3%       1.1%     86.8%     -0.2%
*
*                               HWFE    50.4%       13.8%      -0.3%     87.0%     -0.4%


                                                   EMISSIONS (g/mi)
TEST       TEST      ODOM    TEST   ---------------------------------------      F.E.
NUMBER     DATE      (mi)    CYCLE      HC        CO         NOx        TP       (mpg)    TRAP TYPE/COMMENTS
------   --------   -----    ----    -------    ------     ------     -----     -------   --------------------------------

811825   03-16-82   44284    FTP       N/R        N/R        N/R       .443       N/R     Dummy -- VOID
811826   03-17-82   44296    FTP     .25595      .9147     2.0067      .452     22.6096   Dummy
811827   03-17-82   44307    HWFE    .08141      .5393     1.8910      .303     26.9951   Dummy
811829   03-18-82   44348    HWFE    .09147      .5484     1.7301      .308     28.5833   Dummy
812695   03-24-82   44393    FTP     .32393      .9830     1.9280      .463     22.9500   Dummy
812764   03-25-82   44412    HWFE    .09235      .5824     1.8366      .302     28.6592   Dummy
  ------------------------   ----    -------    ------     ------     -----     -------
  MEAN  (COUNT):             FTP     .28994(2)  .9489(2)  1.9673(2)  .453(3)  22.7785(2)
     STANDARD DEVIATION:             .04807     .0483      .0556     .010

  MEAN  (COUNT):             HWFE(3) .08841     .5567     1.8192     .304     28.0576
     STANDARD DEVIATION:             .00608     .0227      .0818     .003


812765   04-01-82   44439    FTP     .24544      .9906     1.9414      .100     23.0664   Corning EX-47 12" non-catalyzed (#2)
812766   04-01-82   44451    HWFE    .11342      .5701     1.7424      .055     28.9818   Corning EX-47 12" non-catalyzed (#2)
812768   04-02-82   44481    FTP     .23327     1.0209     1.9688      .068     22.6050   Corning EX-47 12" non-catalyzed (#2)
812769   04-06-82   44450    HWFE    .09853      .5468     1.7622      .051     28.3429   Corning EX-47 12" non-catalyzed (#2)
812771   04-09-82   44570    HWFE    .08157      .5223     1.8090      .047     28.4294   Corning EX-47 12" non-catalyzed (#2)
812774   04-09-82   44610    HWFE    .07713      .5242     1.7920      .053     28.5099   Corning EX-47 12" non-catalyzed (#2)
812775   04-13-82   44640    FTP     .14617      .9907     1.9530      .043     22.7221   Corning EX-47 12" non-catalyzed (#2)
812776   04-14-82   44652    FTP     .15167      .9483     2.0035      .077     22.4738   Corning EX-47 12" non-catalyzed (#2)
812777   04-14-82   44665    STEADY STATE                                               REGENERATION
812778   04-16-82   44692    FTP     .10308      .9558     1.9400      .049     23.1980   Corning EX-47 12" non-catalyzed (#2)
812779   04-16-82   44704    HWFE    .05233      .5423     1.7165      .027     29.4204   Corning EX-47 12" non-catalyzed (#2)
812781   04-23-82   44750    FTP     .16360      .9950     2.0440      .078     21.6097   Corning EX-47 12" non-catalyzed (#2)
812782   04-23-82   44763    HWFE    .05461      .5529     1.8387      .044     27.5848   Corning EX-47 12" non-catalyzed (#2)
812783   04-27-82   44793    FTP     .17608      .9851     2.1045      .082     21.5173   Corning EX-47 12" non-catalyzed (#2)
812784   04-29-82   44805    STEADY STATE                                               REGENERATION
812785   05-05-82   44847    FTP     .13319      .9998     1.9907      .092     22.4727   Corning EX-47 12" non-catalyzed (#2)
812787   05-18-82   44868    HWFE      N/R       .5559     1.9016      .038     27.5975   Corning EX-47 12" non-catalyzed (#2)
812788   05-18-82   44888    HWFE      N/R       .5658     1.8508      .036     27.6713   Corning EX-47 12" non-catalyzed (#2)
812786   05-19-82   44918    FTP       N/R      1.0031     2.1044      .085     22.3793   Corning EX-47 12" non-catalyzed (#2)
  ------------------------   ----    -------    ------     ------     -----     -------
  MEAN  (COUNT):             FTP     .16906(8)  .9877(9)  2.0056(9)  .075(9)  22.4361(9)
     STANDARD DEVIATION:             .04855     .0223      .0650     .019

  MEAN  (COUNT):             HWFE    .07960(6)  .5475(8)  1.8016(8)  .044(8)  28.3030(8)
     STANDARD DEVIATION:             .02400     .0175      .0612     .010
```

```
*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  3-16-82 THROUGH  3-28-82):
*
*      RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                                   FTP      .5831     1.0409     1.0195     .1656      .9850
*
*                                   HWFE     .9044      .9835      .9903     .1447     1.0087
*
*      Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                                   FTP     41.7%      -4.1%      -1.9%     83.4%       1.5%
*
*                                   HWFE    10.0%       1.7%       1.0%     85.5%      -0.9%
*

                                              EMISSIONS (g/mi)
TEST     TEST       ODOM    TEST     ------------------------------------------    F.E.
NUMBER   DATE       (mi)    CYCLE       HC        CO         NOx        TP        (mpg)    TRAP TYPE/COMMENTS
------   --------   -----   ----     -------    ------     ------     -----     -------    --------------------------------

813605   05-26-82   44974   FTP       .21294    1.0161     1.9456      .498     23.2803    NGK #3
813606   05-27-82   44960   FTP       .22723    1.0189     1.9285      .376     23.3313    NGK #3
813607   05-27-82   44993   HWFE      .08587     .5615     1.6860      .143     29.3240    NGK #3
813609   05-28-82   45044   HWFE      .09267     .5609     1.7153      .143     29.2381    NGK #3
813611   06-17-82   45149   STEADY STATE                                                   REGENERATION
813612   06-22-82   45206   STEADY STATE                                                   REGENERATION
813613   06-23-82   45207   FTP       .18993    1.0188     2.0056      .265     22.6118    NGK #3
813614   06-25-82   45221   HWFE      .07634     .5545     1.7353      .118     29.2432    NGK #3
813616   06-30-82   45293   FTP       .22686    1.0328     2.0396      .220     22.0184    NGK #3
813617   06-30-82   45265   HWFE      .08536     .5642     1.7357      .112     28.9075    NGK #3
813619   07-15-82   45356   FTP       .20961    1.0225     1.9872      .219     22.1656    NGK #3
813620   07-15-82   45369   HWFE      .08319     .5604     1.7504      .131     28.1882    NGK #3
814756   07-20-82   45409   FTP       .19342    1.0112     2.1177      .253     22.2173    NGK #3
814757   07-20-82   45423   HWFE      .06886     .5467     1.8157      .126     28.8321    NGK #3
814759   07-22-82   45459   FTP       .18897    1.0174     2.0384      .298     22.1688    NGK #3
814760   07-23-82   45486   STEADY STATE                                                   REGENERATION
814762   07-29-82   45521   FTP        N/R        N/R        N/R        N/R        N/R      NGK #3 -- VOID
814763   07-29-82   45533   HWFE      .07339     .5267     1.7822      .213     27.9623    NGK #3
814766   07-30-82   45596   HWFE      .07007     .5409     1.8228      .188     27.7329    NGK #3
814748   08-03-82   45628   FTP       .35417     .9787     1.9937      .280     22.3411    NGK #3
814749   08-04-82   45641   STEADY STATE                                                   REGENERATION
814750   08-12-82   45686   HWFE      .08014     .5633     1.6872      .192     29.2411    NGK #3
814751   08-18-82   45716   FTP       .18781    1.0136     1.9853      .333     22.9184    NGK #3
814752   08-18-82   45728   HWFE      .07868     .5242     1.7127      .233     29.8469    NGK #3
814754   08-19-82   45757   FTP       .17521     .9099     2.0311      .307     23.0324    NGK #3
  ----------------------   ----   -------    ------     ------     -----     -------
  MEAN  (COUNT):            FTP (10) .21661   1.0040     2.0073      .305     22.5989
     STANDARD DEVIATION:             .05138    .0359      .0536      .083

  MEAN  (COUNT):            HWFE(10) .07946    .5503     1.7443      .160     28.8367
     STANDARD DEVIATION:             .00755    .0151      .0487      .043

                                                                                           Testing terminated due to trap damage.
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*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  3-16-82 THROUGH  3-28-82):
*
*      RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                               FTP      .7471      1.0581      1.0203      .6733       .9921
*
*                               HWFE     .8988       .9885       .9588      .5263      1.0278
*
*      Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                               FTP     25.3%       -5.8%       -2.0%      32.7%       0.8%
*
*                               HWFE    10.1%        1.1%        4.1%      47.4%      -2.8%
*

                                                   EMISSIONS (g/mi)
TEST      TEST       ODOM     TEST     ----------------------------------------       F.E.
NUMBER    DATE       (mi)     CYCLE       HC         CO         NOx        TP         (mpg)     TRAP TYPE/COMMENTS
------  --------    -----     ----     -------     ------     ------     -----       -------    ----------------------------------

814755  09-02-82    45778     FTP       .21694      .9231     1.8160      .073       24.1725    NGK #4
814768  09-02-82    45790     HWFE      .09336      .5017     1.5822      .133       31.0285    NGK #4
814770  09-14-82    45888     FTP       .20838      .9349     1.8763      .099       23.5577    NGK #4
814771  09-14-82    45900     HWFE      .08314      .5360     1.6671      .161       29.4981    NGK #4
814773  09-15-82    45955     HWFE       N/R        .5209     1.6829      .053       29.9571    NGK #4
814775  09-21-82    46021     FTP        N/R        .9453     1.9068      .052       22.9887    NGK #4
814776  09-21-82    46064     STEADY STATE                                                    REGENERATION
814777  09-22-82    46064     FTP       .12991      .9072     1.8836      .035       23.3038    NGK #4
816085  09-22-82    46076     HWFE      .05629      .5278     1.6328      .021       29.8526    NGK #4
816068  09-23-82    46105     FTP       .15518      .9395     1.8783      .030       23.4579    NGK #4
816069  09-23-82    46117     HWFE      .06536      .5509     1.6385      .027       29.6729    NGK #4
816071  09-28-82    46147     STEADY STATE                                                    REGENERATION
816072  09-29-82    46177     FTP       .14123      .9402     1.8690      .039       23.7337    NGK #4
816073  09-29-82    46189     HWFE      .05419      .5394     1.5715      .028       30.4773    NGK #4
816075  09-30-82    46218     FTP        N/R        .9645     1.9160      .039       23.1450    NGK #4
816076  09-30-82    46230     HWFE       N/R        .5233     1.6513      .030       29.2564    NGK #4
816078  10-07-82    46253     STEADY STATE                                                    REGENERATION
816079  10-13-82    46287     FTP        N/R        .9976     1.8961      .037       23.4052    NGK #4
816080  10-13-82    46299     HWFE       N/R        .5265     1.6788      .033       29.4244    NGK #4
816082  10-14-82    46331     FTP        N/R        .9564     1.8823      .035       23.1662    NGK #4
816083  10-14-82    46343     HWFE       N/R        .5301     1.6187      .028       29.5801    NGK #4
816494  10-19-82    46391     HWFE       N/R        .5519     1.7464      .056       29.0857    NGK #4
816496  10-21-82    46435     FTP        N/R        .9016     2.1080      .048       22.7363    NGK #4
816497  10-22-82    46435     FTP        N/R        .9010     1.9530      .041       22.7379    NGK #4
816498  10-26-82    48447     STEADY STATE                                                    REGENERATION
816500  10-27-82    46488     HWFE       N/R        .5097     1.6772      .026       29.7721    NGK #4
816502  10-28-82    46508     FTP        N/R        .9346     1.9292      .046       23.0389    NGK #4
816503  10-28-82    46529     HWFE       N/R        .5001     1.6863      .028       29.1771    NGK #4
----------------------------  ----     -------     ------     ------     -----       -------
  MEAN  (COUNT):              FTP      .17033(5)  .9372(12) 1.9095(12) .048(12) 23.2802(12)
     STANDARD DEVIATION:               .03979     .0278       .7121    .020

  MEAN  (COUNT):              HWFE     .07047(5)  .5265(12) 1.6528(12) .052(12) 29.7221(12)
     STANDARD DEVIATION:               .01715     .0169       .0483    .046
```

```
*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  1-04-83 THROUGH  1-06-83):
*
*      RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                                FTP       .8386       .9674       .9835      .1151       .9849
*
*                                HWFE      .8040       .9863       .9917      .1630       .9930
*
*      Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                                FTP      16.1%        3.3%        1.6%      88.5%        1.5%
*
*                                HWFE     19.6%        1.4%        0.8%      83.7%        0.7%
*

                                                 EMISSIONS (g/mi)
TEST      TEST      ODOM    TEST     ------------------------------------------     F.E.
NUMBER    DATE      (mi)    CYCLE       HC        CO        NOx       TP           (mpg)     TRAP TYPE/COMMENTS
------  --------   -----    ----     -------    ------    ------    -----        -------    --------------------------------

816505  11-02-82   46569    FTP        N/R       .9047    1.8225     .064        24.8396    NGK #4-2
816506  11-02-82   46581    HWFE       N/R       .6036    1.6156     .052        30.6431    NGK #4-2
816508  11-10-82   46619    FTP       .23030    1.0056    1.8693     .071        23.9351    NGK #4-2
816509  11-10-82   46631    HWFE      .09727     .5650    1.6490     .043        30.2799    NGK #4-2
816511  11-17-82   46668    FTP        N/R        N/R       N/R      N/R           N/R      NGK #4-2 -- VOID
816512  11-17-82   46680    HWFE       N/R        N/R       N/R      N/R           N/R      NGK #4-2 -- VOID
816513  11-23-82   46737    FTP        N/R      1.0144    1.9822     .064        22.6215    NGK #4-2
816514  11-23-82   46749    HWFE      .05125     .5625    1.7338     .044        28.7533    NGK #4-2
817145  11-24-82   46828    HWFE      .05621     .5484    1.7803     .046        28.0410    NGK #4-2
817146  11-24-82   48806    FTP       .14083     .9760    2.0025     .029        22.3745    NGK #4-2
817116  12-01-82   46865    STEADY STATE                                                   REGENERATION
817117  12-02-82   46902    FTP       .20001     .9783    1.9903     .051        22.7145    NGK #4-2
817118  12-02-82   46916    HWFE      .05653     .5404    1.7386     .030        29.2505    NGK #4-2
817119  12-03-82   46944    FTP       .10731     .9831    1.9792     .035        22.6280    NGK #4-2
817120  12-03-82   46956    HWFE      .04712     .5307    1.7286     .022        28.5166    NGK #4-2
817121  12-08-82   46989    STEADY STATE                                                   REGENERATION
817122  12-22-82   47058    FTP       .11205     .9286    1.9705     .056        22.4815    NGK #4-2
817123  12-22-82   47070    HWFE      .05199     .5196    1.7742     .040        28.1229    NGK #4-2
817124  12-29-82   47109    FTP       .11647    1.0070    2.0281     .119        21.9891    NGK #4-2
817125  12-29-82   47121    HWFE      .04630     .5250    1.7829     .059        27.8163    NGK #4-2
------------------------    ----     -------    ------    ------    -----        -------
  MEAN  (COUNT):            FTP       .15116(6)  .9747(8)  1.9556(8)  .061(8)    22.9153(8)
     STANDARD DEVIATION:              .05179     .0391      .0710     .028

  MEAN  (COUNT):            HWFE      .05810(7)  .5494(8)  1.7254(8)  .042(8)    28.8951(8)
     STANDARD DEVIATION:              .01772     .0274      .0619     .012
```

```
*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  1-04-83 THROUGH  1-06-83):
*
*      RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                                  FTP      .7442      1.0061      1.0073      .1463       .9694
*
*                                  HWFE     .6628      1.0292      1.0352      .1316       .9654
*
*      Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                                  FTP     25.6%       -0.6%       -0.7%      85.4%        3.1%
*
*                                  HWFE    33.7%       -2.9%       -3.5%      86.8%        3.5%
*

                                                     EMISSIONS (g/mi)
TEST       TEST       ODOM     TEST    -------------------------------------------         F.E.
NUMBER     DATE       (mi)     CYCLE       HC         CO          NOx        TP            (mpg)     TRAP TYPE/COMMENTS
------   --------    -----     ----    -------     ------      ------      -----         -------     ---------------------------------

817127   01-04-83    47161     FTP      .19895      .9984      1.9644       .434         23.4454     Baseline
817128   01-04-83    47171     HWFE     .09034      .5452      1.6875       .340         29.8408     Baseline
817129   01-06-83    47197     FTP      .20729      .9392      1.9187       .400         23.8333     Baseline
817130   01-06-83    47207     HWFE     .08496      .5225      1.6459       .298         30.0215     Baseline
  ---------------------------------    ----    -------     ------      ------      -----         -------
  MEAN  (COUNT):                   FTP (2)  .20312      .9688      1.9415       .417         23.6379
      STANDARD DEVIATION:                   .00590      .0419       .0323       .024

  MEAN  (COUNT):                   HWFE(2)  .08765      .5338      1.6667       .319         29.9312
      STANDARD DEVIATION:                   .00380      .0161       .0294       .030
```

Appendix A-2

Emissions Test Data on Peugeot 504 Diesel

VEHICLE I.D. 504ACO-2700783 (1978 PEUGEOT 504)

TEST NUMBER	TEST DATE	ODOM (mi)	TEST CYCLE	EMISSIONS (g/mi)				F.E. (mpg)	TRAP TYPE/COMMENTS
				HC	CO	NOx	TP		
799861	09-12-79	7375	FTP	.68810	1.5910	1.1912	.369	26.1117	Baseline
799862	09-12-79	7397	HWFE	.28700	.6260	1.0380	.233	33.2192	Baseline
799867	10-26-79	7501	FTP	.62320	1.3980	1.1561	.309	24.6886	Baseline
799868	10-26-79	7521	HWFE	.23670	.5860	1.0260	.202	33.8399	Baseline
799869	10-30-79	7541	FTP	.93810	1.5680	1.1371	N/R	26.9561	Baseline
799870	10-31-79	7552	FTP	.78200	1.5280	1.0046	.254	32.4244*	Baseline
799871	10-31-79	7572	HWFE	.28170	.6770	.7004	.209	33.4744	Baseline
799872	11-01-79	7586	FTP	.82170	1.7160	1.1748	.318	27.9346	Baseline
799873	11-01-79	7606	HWFE	.28600	.6590	1.1120	.210	33.9642	Baseline
MEAN (COUNT):			FTP	.77062(5)	1.5602(5)	1.1328(5)	.312(4)	27.3913(5)	Fuel Economy mean is harmonic; all other means are arithmetic.
STANDARD DEVIATION:				.12179	.1147	.0744	.047		
MEAN (COUNT):			HWFE(4)	.27285	.6370	.9691	.214	33.6214	
STANDARD DEVIATION:				.02421	.0400	.1831	.013		
800500	11-20-79	7854	FTP	.07990	.0650	1.0354	.095	26.6096	Johnson Matthey JM-4 #1
800501	11-20-79	7874	HWFE	N/R	.0000	.9663	.265	33.9158	Johnson Matthey JM-4 #1
800503	11-21-79	7917	FTP	N/R	.1080	N/R	.153	26.0020	Johnson Matthey JM-4 #1
800504	11-21-79	7928	HWFE	N/R	-.0040	N/R	.943	32.8218	Johnson Matthey JM-4 #1
800506	11-28-79	7987	FTP	N/R	.0960	1.1138	.096	26.1377	Johnson Matthey JM-4 #1
800507	11-28-79	7998	HWFE	N/R	.0000	.9775	.703	34.3741	Johnson Matthey JM-4 #1
800512	12-11-79	8500	FTP	.08960	.0660	1.0794	.654	25.7327	Johnson Matthey JM-4 #1
800513	12-11-79	8522	HWFE	N/R	.0000	.9800	1.281	32.5947	Johnson Matthey JM-4 #1
800514	12-12-79	8559	FTP	.03260	.0680	1.1145	.541	25.9420	Johnson Matthey JM-4 #1
800515	12-12-79	8570	HWFE	.06600	.0000	.9360	1.144	33.3404	Johnson Matthey JM-4 #1
MEAN (COUNT):			FTP	.06737(3)	.0806(5)	1.0858(4)	.308(5)	26.0817(5)	
STANDARD DEVIATION:				.03050	.0200	.0374	.268		
MEAN (COUNT):			HWFE	.06600(1)	.0000(5)	.9650(4)	.867(5)	33.3968(5)	
STANDARD DEVIATION:				N/A	.0000	.0202	.401		

Testing terminated after 600 miles due to higher TP emissions (on FTP, LA-4, & HWFE) than baseline, also high EGBP.

* EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA FROM BASELINE TESTING (9-12-79 THROUGH 3-13-79):

RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:

FTP	.0874	.0528	.9683	.9716	.9500
HWFE	.2419	.0000	.9822	4.0704	1.0024

Percent Change, that is (1 - Ratio) x 100 % :

FTP	91.3%	94.7%	3.2%	2.8%	5.0%
HWFE	75.8%	100.0%	1.8%	-307.0%	-0.2%

				EMISSIONS (g/mi)					
TEST NUMBER	TEST DATE	ODOM (mi)	TEST CYCLE	HC	CO	NOx	TP	F.E. (mpg)	TRAP TYPE/COMMENTS
800517	02-29-80	8368	FTP	N/R	1.3410	1.0895	.336	27.9779	Baseline
800518	03-12-80	8378	FTP	N/R	1.5440	1.0967	.318	27.2677	Baseline
800530	03-13-80	8687	HWFE	N/R	.6880	1.0360	.209	32.1563	Baseline
MEAN (COUNT):			FTP (2)	N/A	1.4425	1.0931	.327	27.6182	
STANDARD DEVIATION:				N/A	.1435	.0051	.013		
MEAN (COUNT):			HWFE(1)	N/A	.6880	1.0360	.209	32.1563	
800531	03-27-80	8736	FTP	.02850	.0560	1.1099	.186	24.8644	Johnson Matthey JM-4 #2
800532	03-27-80	8749	HWFE	N/R	.0120	.9790	.223	32.6494	Johnson Matthey JM-4 #2
800533	03-28-80	8792	FTP	.05180	.1220	.9714	.140	29.7264	Johnson Matthey JM-4 #2
800534	03-28-80	8806	HWFE	N/R	.0020	.8970	N/R	36.3474*	Johnson Matthey JM-4 #2
800524	04-02-80	8879	FTP	N/R	.1750	1.0617	N/R	27.2441	Johnson Matthey JM-4 #2
800525	04-02-80	8897	HWFE	N/R	.0120	.9300	.764	34.7736	Johnson Matthey JM-4 #2
800526	04-09-80	8954	FTP	N/R	.1750	.9846	.274	27.3931	Johnson Matthey JM-4 #2
800527	04-09-80	8979	HWFE	N/R	.0160	.9830	1.182	32.5472	Johnson Matthey JM-4 #2
800528	04-10-80	9035	FTP	N/R	.1910	.9913	.290	27.6889	Johnson Matthey JM-4 #2
800529	04-10-80	9059	HWFE	N/R	.0160	.9480	.992	32.3730	Johnson Matthey JM-4 #2
800521	04-17-80	9246	HWFE	N/R	.0060	.8460	.816	35.5109	Johnson Matthey JM-4 #2
800516	04-22-80	9315	FTP	N/R	.2010	.9568	.137	27.9936	Johnson Matthey JM-4 #2
800535	05-22-80	9351	FTP	.16010	.1220	.9859	.178	28.3714	Johnson Matthey JM-4 #2
800537	05-22-80	9374	HWFE	.09450	.0000	1.0140	1.095	33.8871	Johnson Matthey JM-4 #2
MEAN (COUNT):			FTP	.08013(3)	.1489(7)	1.0088(7)	.201(6)	27.5421(7)	
STANDARD DEVIATION:				.07023	.0515	.0556	.066		
MEAN (COUNT):			HWFE	.09450(1)	.0091(7)	.9424(7)	.845(6)	33.9501(7)	
STANDARD DEVIATION:				N/A	.0065	.0572	.344		

Similar to JM-4 #1 but with superior flow characteristics.

* EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA FROM BASELINE TESTING (9-12-79 THROUGH 3-13-80):

RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:

FTP	.1040	.0975	.8995	.6413	1.0031
HWFE	.3463	.0141	.9592	3.9671	1.0190

Percent Change, that is (1 - Ratio) x 100 % :

FTP	89.6%	90.2%	10.0%	35.9%	-0.3%
HWFE	65.4%	98.6%	4.1%	-296.7%	-1.9%

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* Questionable data

```
                                                                                              1,000 miles accumulated

TEST      TEST      ODOM    TEST                 EMISSIONS (g/mi)
NUMBER    DATE      (mi)    CYCLE    ---------------------------------------      F.E.
------  --------   -----    ----      HC        CO        NOx       TP          (mpg)     TRAP TYPE/COMMENTS
                                    -------   ------    ------    -----       -------   --------------------------------

800519  06-03-80   10428    FTP      .62310    .4000     .9879     .457       22.7344   Johnson Matthey JM-4 #2
800520  06-03-80   10443    HWFE     .13700    .0000     .8440    1.591       32.4518   Johnson Matthey JM-4 #2
803659  06-04-80   10499    FTP      .29760    .2890     .9756     .436       26.6088   Johnson Matthey JM-4 #2
803660  06-04-80   10519    HWFE     .05600    .0000     .8640    1.488       31.5449   Johnson Matthey JM-4 #2
----------------------------        -------   ------    ------    -----       -------
  MEAN  (COUNT):            FTP (2)  .46035    .3445     .9818     .446       24.5194
     STANDARD DEVIATION:             .23016    .0785     .0087     .015

  MEAN  (COUNT):            HWFE(2)  .09650    .0000     .8540    1.540       31.9918
     STANDARD DEVIATION:             .05728    .0000     .0141     .073

*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA FROM BASELINE TESTING (9-12-79 THROUGH  3-13-80):
*
*     RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                           FTP      .5974     .2257     .8755    1.4230       .8931
*
*                           HWFE     .3537     .0000     .8692    7.2300       .9602
*
*     Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                           FTP      40.3%     77.4%     12.5%    -42.3%       10.7%
*
*                           HWFE     64.6%    100.0%     13.1%   -623.0%        4.0%


803628  07-03-80   10624    FTP      .02340    .0490     .7301     .144       27.1309   Johnson Matthey JM-4 #2 w low sulfur fuel
803629  07-09-80   10654    FTP      .04950    .0530     .8671     .113       27.8548   Johnson Matthey JM-4 #2 w low sulfur fuel
803630  07-09-80   10667    HWFE      N/R     -.0090     .7760     .286       33.9384   Johnson Matthey JM-4 #2 w low sulfur fuel
803631  07-15-80   10717    HWFE      N/R      .0000     .7590     .259       33.4533   Johnson Matthey JM-4 #2 w low sulfur fuel
803631+ 07-15-80   10717    HWFE      N/R      .0000     .8030      N/R       32.3531   Johnson Matthey JM-4 #2 w low sulfur fuel
----------------------------  ----  -------   ------    ------    -----       -------
  MEAN  (COUNT):            FTP (2)  .03645    .0510     .7986     .128       27.4884
     STANDARD DEVIATION:             .01846    .0028     .0969     .022

  MEAN  (COUNT):            HWFE      N/A      .0000(3)  .7793(3)  .272(2)  32.2347(3)
     STANDARD DEVIATION:              N/A      .0000     .0222     .019

*  EFFECT OF LOW SULFUR FUEL ON ABOVE TRAP COMPARED TO SAME TRAP TESTED WITH NO. 2 DIESEL FUEL (3-22-80 THROUGH 6-4-80):
*
*     RATIO OF TEST DATA WITH LOW SULFUR FUEL TO TEST DATA WITH NO. 2 DIESEL FUEL:
*
*                           FTP      .1570     .2652     .7964     .4885       .9981
*
*                           HWFE      N/A      .0000     .8445     .2670       .9495
```

Appendix A-3

Emissions Test Data on Toyota Crown Diesel

(Caution: Odometer values for this vehicle
are given in kilometers.)

VEHICLE I.D. K-LS110-SEMFSY (1981 TOYOTA CROWN SUPER DELUXE)

TEST NUMBER	TEST DATE	ODOM (km)	TEST CYCLE	EMISSIONS (g/mi)				F.E. (mpg)	TRAP TYPE/COMMENTS
				HC	CO	NOx	TP		
810714	09-01-81	1730	FTP	.38349	1.1801	1.3974	.309	25.9541	Dummy Trap
810715	09-01-81	1737	HWFE	.18551	.5809	1.1950	.195	34.5527	Dummy Trap
810717	09-02-81	1812	HWFE	.18121	.5888	1.2716	.219	34.6704	Dummy Trap
810719	09-03-81	1864	FTP	.37204	1.1150	1.4581	.316	26.2304	Dummy Trap
810720	09-10-81	1906	FTP	.36574	1.1998	1.5903	.365	24.9378	Dummy Trap
810721	09-10-81	1943	HWFE	.18465	.5944	1.3013	.238	34.3181	Dummy Trap
810725	09-15-81	2080	FTP	.35640	1.1255	1.4865	.322	26.2327	Dummy Trap
810726	09-15-81	2090	HWFE	.17678	.5815	1.1317	.211	34.4391	Dummy Trap
MEAN (COUNT):			FTP (4)	.36942	1.1551	1.4831	.328	25.8278	Fuel Economy mean is harmonic; all other means are arithmetic.
STANDARD DEVIATION:				.01137	.0413	.0806	.025		
MEAN (COUNT):			HWFE(4)	.18204	.5864	1.2249	.216	34.4947	
STANDARD DEVIATION:				.00397	.0064	.0766	.018		
810732	09-24-81	2360	FTP	.21746	1.0196	1.5550	.268	27.1144	ICI Saffil fourth generation
810935	10-01-81	2446	FTP	.33636	1.0705	1.4551	.237	25.9754	ICI Saffil fourth generation
810936	10-01-81	2456	HWFE	.14405	.5848	1.2018	.133	33.8778	ICI Saffil fourth generation
810938	10-06-81	2539	FTP	.33187	1.0511	1.5562	.215	26.6589	ICI Saffil fourth generation
810939	10-07-81	2564	FTP	.31036	.9942	1.5388	.184	26.4624	ICI Saffil fourth generation
810940	10-07-81	2623	HWFE	.15118	.5728	1.2244	.128	34.3343	ICI Saffil fourth generation
810942	10-08-81	2653	FTP	.31753	1.0445	1.5161	.213	26.1157	ICI Saffil fourth generation
810943	10-08-81	2678	HWFE	.15006	.5615	1.2100	.112	34.5698	ICI Saffil fourth generation
MEAN (COUNT):			FTP (5)	.30272	1.0360	1.5242	.223	26.4592	
STANDARD DEVIATION:				.04881	.0296	.0419	.031		
MEAN (COUNT):			HWFE(3)	.14843	.5730	1.2121	.124	34.2583	
STANDARD DEVIATION:				.00383	.0117	.0114	.011		

Testing terminated due to insufficient trapping efficiency.

* EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM 9- 1-81 THROUGH 10-21-81):

RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:

FTP	.8259	.9175	1.0209	.7217	1.0174
HWFE	.7810	.9659	1.0021	.5799	.9955

Percent Change, that is (1 - Ratio) x 100 % :

FTP	17.4%	8.2%	-2.1%	27.8%	-1.7%
HWFE	21.9%	3.4%	-0.2%	42.1%	0.4%

TEST NUMBER	TEST DATE	ODOM (km)	TEST CYCLE	EMISSIONS (g/mi)				F.E. (mpg)	TRAP TYPE/COMMENTS
				HC	CO	NOx	TP		
810945	10-20-81	2755	FTP	.35207	1.0536	1.5053	.281	26.3099	Dummy Trap
810946	10-21-81	2777	FTP	.36940	1.1007	1.5201	.260	26.4376	Dummy Trap
811153	10-21-81	2796	HWFE	.20612	.6076	1.2002	.233	33.9633	Dummy Trap
811154	10-21-81	2830	HWFE	.20607	.6060	1.1572	.186	34.5397	Dummy Trap
MEAN (COUNT):			FTP (2)	.36074	1.0772	1.5127	.270	26.3734	
STANDARD DEVIATION:				.01225	.0333	.0105	.015		
MEAN (COUNT):			HWFE(2)	.20610	.6068	1.1787	.210	34.2489	
STANDARD DEVIATION:				.00004	.0011	.0304	.033		
811157	10-22-81	2925	FTP	.38914	1.0830	1.5009	.261*	26.3669	NGK #1
811158	10-27-81	2961	FTP	.34599	1.0565	1.4432	.133	27.1526	NGK #1
811159	10-27-81	2983	HWFE	.16529	.5658	1.1203	.086	35.1594	NGK #1
811161	10-28-81	3069	HWFE	.15884	.5687	1.1407	.046	34.2159	NGK #1
811378	11-10-81	3527	FTP	.27745	1.0549	1.4741	.063	26.2582	NGK #1
811379	11-10-81	3553	HWFE	.14245	.6550	1.1587	.039	33.4195	NGK #1
811380	11-12-81	3602	FTP	.23063	1.0664	1.4767	.048	26.1983	NGK #1
811381	11-12-81	3632	HWFE	.12921	.6301	1.1743	.032	33.3197	NGK #1
811576	11-18-81	4053	STEADY STATE						REGENERATION
811577	11-19-81	4073	FTP	.32747	1.1277	1.3938	.099	26.7916	NGK #1
811578	11-19-81	4098	HWFE	.17030	.5838	1.1158	.045	34.4417	NGK #1
811642	11-25-81	4171	FTP	.28351	.9312	1.5439	.101	26.3375	NGK #1
811643	11-25-81	4195	HWFE	.15453	.5837	1.2189	.049	33.5389	NGK #1
811645	12-08-81	4607	FTP	.35107	1.2275	1.5108	.068	25.2472	NGK #1
811646	12-08-81	4631	HWFE	.13262	.6370	1.2412	.039	32.9925	NGK #1
811648	12-10-81	4686	FTP	.23480	1.0190	1.5403	.049	25.3540	NGK #1
811649	12-10-81	4708	HWFE	.13451	.6937	1.2504	.029	32.2517	NGK #1
811788	12-11-81	4763	STEADY STATE						REGENERATION
811789	12-15-81	4805	FTP	.34349	.9934	1.4339	.154	27.1613	NGK #1
811790	12-15-81	4827	HWFE	.18716	.5992	1.1533	.061	35.3897	NGK #1
811792	12-16-81	4880	FTP	.40704	1.0452	1.4860	.102	26.9243	NGK #1
811793	12-16-81	4901	HWFE	.19454	.6579	1.2181	.059	34.1865	NGK #1
811797	01-07-82	5458	FTP	.24459	1.0765	1.4082	N/R	25.9273	NGK #1
812030	01-07-82	5481	HWFE	.14436	.6738	1.1214	N/R	34.0887	NGK #1
811985	01-08-82	5572	FTP	.27943	1.0366	1.4207	.066	26.2588	NGK #1
811986	01-08-82	5595	STEADY STATE						REGENERATION
811987	01-12-82	5639	FTP	.30177	1.0773	1.4173	.138	26.6623	NGK #1
811988	01-12-82	5660	HWFE	.17566	.6343	1.1255	.059	34.6649	NGK #1
811990	01-13-82	5725	FTP	.36439	1.1726	1.3707	.081	26.1593	NGK #1
811991	01-13-82	5749	HWFE	.20334	.6206	1.1007	.056	34.0763	NGK #1
MEAN (COUNT):			FTP	.31291(14)	1.0691(14)	1.4638(14)	.105(13)	26.3310(14)	
STANDARD DEVIATION:				.05679	.0728	.0525	.058		
MEAN (COUNT):			HWFE	.16099(13)	.6234(13)	1.1646(12)	.050(13)	33.9593(13)	
STANDARD DEVIATION:				.02434	.0409	.0514	.016		

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* Questionable data

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*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM 10-20-81 THROUGH  2-11-82):
*
*     RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                              FTP     .7730      .9559     1.0023     .3737      .9989
*
*                              HWFE    .7216     1.0237     1.0272     .2421      .9867
*
*     Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                              FTP    22.7%       4.4%      -0.2%     62.6%       0.1%
*
*                              HWFE   27.8%      -2.4%      -2.7%     75.8%       1.3%
*

                                                EMISSIONS (g/mi)
TEST      TEST     ODOM   TEST    ------------------------------------           F.E.
NUMBER    DATE     (km)   CYCLE     HC        CO         NOx        TP         (mpg)     TRAP TYPE/COMMENTS
------  --------  -----   ----    -------   ------     ------     -----       -------    ---------------------------------

811994  02-09-82   5838   HWFE    .23463     .6095     1.0835      .198       34.5289    Dummy
811996  02-10-82   5886   FTP     .47086    1.1407     1.4162      .297       26.0727    Dummy
811997  02-10-82   5905   HWFE    .24560     .6127     1.0942      .208       34.6424    Dummy
811999  02-11-82   5961   FTP     .42689    1.1788     1.4002      .288       26.6237    Dummy
812000  02-17-82   5992   FTP      N/R        N/R        N/R        N/R          N/R     Dummy -- VOID
  ----------------------          ----    -------   ------     ------     -----       -------
  MEAN  (COUNT):                  FTP (2)  .44887   1.1597     1.4082      .292       26.3456
     STANDARD DEVIATION:                   .03109    .0269      .0113      .006

  MEAN  (COUNT):                  HWFE(2)  .24011    .6111     1.0888      .203       34.5853
     STANDARD DEVIATION:                   .00776    .0023      .0076      .007


812001  03-09-82   6001   STEADY STATE                                                       Dummy -- REGENERATION
812002  03-10-82   6073   STEADY STATE                                                       Dummy -- REGENERATION
812003  03-10-82   6107   STEADY STATE                                                       Dummy -- REGENERATION

812004  03-11-82   6153   FTP     .28155    1.1069     1.5521      .054       24.0200    W.R. Grace U13U13U25U25U30U30
  ----------------------          ----    -------   ------     ------     -----       -------
  MEAN  (COUNT):                  FTP (1)  .28155   1.1069     1.5521      .054       24.0200


*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  2-09-82 THROUGH  4-22-82):
*
*     RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                              FTP     .7019      .9852     1.1041     .1942      .8965
*
*     Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                              FTP    29.8%       1.5%     -10.4%     80.6%      10.4%
*
```

```
                                              EMISSIONS (g/mi)
TEST     TEST      ODOM   TEST    -----------------------------------------    F.E.
NUMBER   DATE      (km)   CYCLE     HC        CO        NOx        TP          (mpg)    TRAP TYPE/COMMENTS
------  --------   -----  ----    -------   ------    ------     -----        -------   --------------------------------

812005  03-16-82   6224   FTP     .31000    1.1252    1.4856      .146        25.7772   W.R. Grace U13U13 W 8" SPACER
812006  03-17-82   6248   FTP     .30231    1.0420    1.5061      .143        25.8537   W.R. Grace U13U13 W 8" SPACER
812007  03-23-82   6288   HWFE    .17945     .6381    1.2039      .094        32.9769   W.R. Grace U13U13 W 8" SPACER
812009  03-23-82   6318   HWFE    .18118     .6581    1.1535      .090        33.2966   W.R. Grace U13U13 W 8" SPACER
  ----------------------  ----    -------   ------    ------     -----        -------
  MEAN  (COUNT):          FTP (2) .30615    1.0836    1.4958      .144        25.8151
     STANDARD DEVIATION:          .00544     .0588     .0145      .002

  MEAN  (COUNT):          HWFE(2) .18031     .6481    1.1787      .092        33.1356
     STANDARD DEVIATION:          .00122     .0141     .0356      .003


*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  2-09-82 THROUGH  4-22-82):
*
*      RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                                 FTP      .7632      .9645    1.0641      .5180       .9635
*
*                                 HWFE     .8090     1.0499    1.0538      .4682       .9537
*
*      Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                                 FTP      23.7%       3.6%     -6.4%      48.2%       3.7%
*
*                                 HWFE     19.1%      -5.0%     -5.4%      53.2%       4.6%
*

812011  03-25-82   6391   FTP     .33875    1.1322    1.5014      .123        25.7061   W.R. Grace U25U25 W 8" SPACER
812012  03-26-82   6413   HWFE    .20117     .7224    1.2467      .076        31.9222   W.R. Grace U25U25 W 8" SPACER
812014  03-30-82   6485   HWFE    .15674     .7060    1.2138      .067        32.6552   W.R. Grace U25U25 W 8" SPACER
812016  03-31-82   6540   FTP     .25866    1.0796    1.5541      .090        24.7877   W.R. Grace U25U25 W 8" SPACER
  ----------------------  ----    -------   ------    ------     -----        -------
  MEAN  (COUNT):          FTP (2) .29870    1.1059    1.5277      .106        25.2385
     STANDARD DEVIATION:          .05663     .0372     .0373      .023

  MEAN  (COUNT):          HWFE(2) .17895     .7142    1.2302      .072        32.2841
     STANDARD DEVIATION:          .03142     .0116     .0233      .006

*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  2-09-82 THROUGH  4-22-82):
*
*      RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                                 FTP      .7446      .9843    1.0868      .3813       .9420
*
*                                 HWFE     .8029     1.1570    1.0999      .3664       .9292
*
*      Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                                 FTP      25.5%       1.6%     -8.7%      61.9%       5.8%
*
*                                 HWFE     19.7%     -15.7%    -10.0%      63.4%       7.1%
```

```
                                                          EMISSIONS (g/mi)
 TEST       TEST      ODOM     TEST     --------------------------------------------
NUMBER      DATE      (km)     CYCLE       HC        CO        NOx       TP          F.E.
------   ---------   -----     ----     -------    ------    ------    -----        (mpg)     TRAP TYPE/COMMENTS
                                                                                   -------    ---------------------------------
812017   04-06-82     6602     FTP      .10083      .4721    1.4982     .100       24.9371    W.R. Grace CA13CA13 W 8" SPACER
----------------------------   ----     -------    ------    ------    -----       -------
  MEAN   (COUNT):              FTP (1)  .10083      .4721    1.4982     .100       24.9371

*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  2-09-82 THROUGH  4-22-82):
*
*      RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                              FTP      .2514       .4202    1.0658     .3597        .9307
*
*      Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                              FTP      74.9%       58.0%    -6.6%      64.0%        6.9%


812018   04-15-82     6651     FTP      .32712     1.1045    1.4003     .269       27.1524    Dummy
812019   04-20-82     6676     FTP      .37975     1.0701    1.4063     .259       27.3626    Dummy
812020   04-22-82     6695     HWFE     .20213      .5980    1.1196     .173       34.8984    Dummy
812022   04-22-82     6741     HWFE     .21566      .6229    1.1544     N/R        34.6517    Dummy
812024   04-22-82     6788     HWFE     .21641      .6434    1.1413     .208       35.0056    Dummy
----------------------------   ----     -------    ------    ------    -----       -------
  MEAN   (COUNT):              FTP (2)  .35343     1.0873    1.4033     .264       27.2569
     STANDARD DEVIATION:                .03722      .0243     .0042     .007

  MEAN   (COUNT):              HWFE     .21140(3)  .6214(3)  1.1384(3)  .190(2)    34.8517(3)
     STANDARD DEVIATION:                .00804      .0027     .0176     .025
```

TEST NUMBER	TEST DATE	ODOM (km)	TEST CYCLE	EMISSIONS (g/mi) HC	CO	NOx	TP	F.E. (mpg)	TRAP TYPE/COMMENTS
812025	04-27-82	6839	FTP	.29322	1.1723	1.4942	.153	25.2021	Toyota Foam Non-catalyzed
812026	04-28-82	6861	FTP	.27720	1.2238	1.5480	.148	25.6449	Toyota Foam Non-catalyzed
813222	05-04-82	6979	HWFE	.17559	.7297	1.2047	.107	33.9527	Toyota Foam Non-catalyzed
813219	05-19-82	7367	HWFE	N/R	.7297	1.1948	.108	34.0161	Toyota Foam Non-catalyzed
813210	05-20-82	7427	FTP	.25970	1.1432	1.4403	.167	26.4570	Toyota Foam Non-catalyzed
813211	05-26-82	7463	FTP	.46068	1.1165	1.4496	.171	26.5533	Toyota Foam Non-catalyzed
813214	05-28-82	7534	FTP	.28615	1.1531	1.4417	.199	25.9115	Toyota Foam Non-catalyzed
813215	06-02-82	7575	FTP	.27820	1.1792	1.4666	.188	26.3802	Toyota Foam Non-catalyzed
813216	06-02-82	7575	HWFE	N/R	N/R	N/R	N/R	N/R	Toyota Foam Non-catalyzed -- VOID
813217	06-03-82	7641	HWFE	.16063	.7492	1.1809	.109	33.8416	Toyota Foam Non-catalyzed
813225	06-09-82	7725	FTP	.30998	1.1795	1.4858	.203	26.0359	Toyota Foam Non-catalyzed
813226	06-09-82	7747	HWFE	.18683	.7983	1.2447	.124	33.3797	Toyota Foam Non-catalyzed
813228	06-09-82	7800	HWFE	.20631	.8793	1.2503	.138	33.1420	Toyota Foam Non-catalyzed
813230	06-09-82	7882	HWFE	.19713	.8496	1.2310	.123	33.3676	Toyota Foam Non-catalyzed
813231	06-10-82	7889	FTP	.29198	1.1871	1.5113	N/R	25.9061	Toyota Foam Non-catalyzed
813232	06-18-82	7942	FTP	.30302	1.2136	1.5594	.191	26.1010	Toyota Foam Non-catalyzed
814226	06-22-82	8015	STEADY STATE						REGENERATION
814248	06-23-82	8015	FTP	.28829	1.1577	1.5574	.175	26.7266	Toyota Foam Non-catalyzed
814249	06-25-82	8044	FTP	.27829	1.1441	1.5923	.172	26.1137	Toyota Foam Non-catalyzed
814250	06-30-82	8065	HWFE	.19776	.7876	1.2852	.133	33.2685	Toyota Foam Non-catalyzed
814252	07-01-82	8118	HWFE	.20103	.8007	1.3337	.139	33.1573	Toyota Foam Non-catalyzed
814254	07-15-82	8484	FTP	.42145	1.1952	1.4797	.209	26.2790	Toyota Foam Non-catalyzed
814255	07-16-82	8505	HWFE	.20373	.8743	1.2700	.167	33.5820	Toyota Foam Non-catalyzed
814257	07-20-82	8572	FTP	N/R	N/R	N/R	N/R	N/R	Toyota Foam Non-catalyzed -- VOID
814258	07-20-82	8593	HWFE	.18219	.8010	1.2550	.137	33.6019	Toyota Foam Non-catalyzed
814244	07-21-82	8651	FTP	N/R	N/R	N/R	N/R	N/R	Toyota Foam Non-catalyzed -- VOID
814262	08-13-82	8737	HWFE	.19080	.9908	1.3032	.175	32.8081	Toyota Foam Non-catalyzed
814265	08-19-82	8880	STEADY STATE						REGENERATION
814266	08-20-82	8895	FTP	.24228	1.1343	1.4380	.166	26.8106	Toyota Foam Non-catalyzed
814267	08-20-82	8916	HWFE	.16283	.7045	1.1539	.111	34.6567	Toyota Foam Non-catalyzed
814269	08-25-82	8984	FTP	.24668	1.0465	1.4544	.170	26.8184	Toyota Foam Non-catalyzed
814270	08-26-82	9005	HWFE	.18732	.7464	1.1722	.174	34.5210	Toyota Foam Non-catalyzed
MEAN (COUNT):			FTP	.30265(14)	1.1604(14)	1.4942(14)	.178(13)	26.2027(14)	
STANDARD DEVIATION:				.06219	.0446	.0515	.019		
MEAN (COUNT):			HWFE	.18768(12)	.8032(13)	1.2369(13)	.134(13)	33.6304(13)	
STANDARD DEVIATION:				.01510	.0791	.0539	.025		

* EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM 4-15-82 THROUGH 4-22-82):

* RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:

FTP	.8563	1.0672	1.0648	.6742	.9613
HWFE	.8878	1.2926	1.0865	.7053	.9650

* Percent Change, that is (1 - Ratio) x 100 % :

FTP	14.4%	-6.7%	-6.5%	32.6%	3.9%
HWFE	11.2%	-29.3%	-8.7%	29.5%	3.5%

TEST NUMBER	TEST DATE	ODOM (km)	TEST CYCLE	EMISSIONS (g/mi) HC	CO	NOx	TP	F.E. (mpg)	TRAP TYPE/COMMENTS
814272	08-31-82	9072	FTP	.49697	1.0206	1.4413	.245	27.5633	Bridgestone #1
814792	08-31-82	9095	HWFE	.27469	.7069	1.1031	.164	34.0342	Bridgestone #1
814794	09-17-82	9162	FTP	.35567	1.1478	1.4002	.224	27.2856	Bridgestone #1
814795	09-17-82	9184	HWFE	.20750	.6518	1.1159	.135	35.7446	Bridgestone #1
MEAN (COUNT):			FTP (2)	.42632	1.0842	1.4207	.234	27.4236	
STANDARD DEVIATION:				.09991	.0899	.0291	.015		
MEAN (COUNT):			HWFE(2)	.24109	.6794	1.1095	.150	34.8687	
STANDARD DEVIATION:				.04751	.0390	.0091	.021		
									Testing terminated due to exhaust leak.
814797	10-20-82	9439	FTP	N/R	1.1151	1.4649	.170	27.1095	Bridgestone #1-2
814798	10-20-82	9441	HWFE	N/R	.7657	1.1626	.107	35.0104	Bridgestone #1-2
814800	10-21-82	9492	FTP	N/R	1.0948	1.5679	.127	26.2076	Bridgestone #1-2
814801	10-21-82	9514	HWFE	N/R	.7559	1.2633	.098	33.8520	Bridgestone #1-2
814803	10-26-82	9599	STEADY STATE						REGENERATION
814804	10-28-82	9657	FTP	N/R	1.1673	1.4880	.107	26.6810	Bridgestone #1-2
814805	10-28-82	9678	HWFE	N/R	.6914	1.1478	.056	35.0374	Bridgestone #1-2
814807	10-29-82	9729	FTP	N/R	1.2015	1.5372	.083	26.4652	Bridgestone #1-2
814808	10-29-82	9749	HWFE	N/R	.7345	1.2145	.037	33.9743	Bridgestone #1-2
816737	11-02-82	9800	STEADY STATE						REGENERATION
816738	11-03-82	9882	FTP	N/R	1.1873	1.4574	.107	27.3943	Bridgestone #1-2
816739	11-03-82	9939	HWFE	N/R	1.0502	1.4235	.063	29.1455	Bridgestone #1-2
816740	11-03-82	9953	HWFE	.19047	.8305	1.2481	.053	33.8171	Bridgestone #1-2
816741	11-16-82	10005	FTP	.31084	1.1347	1.6144	.082	25.5826	Bridgestone #1-2
816742	11-16-82	10026	HWFE	.18588	.8308	1.3104	.035	32.8364	Bridgestone #1-2
816743	11-17-82	10110	STEADY STATE						REGENERATION
816744	11-18-82	10174	FTP	.23897	1.1196	1.5602	.103	26.8833	Bridgestone #1-2
816745	11-18-82	10195	HWFE	.14213	.6707	1.1910	.048	34.6702	Bridgestone #1-2
816746	11-23-82	10293	FTP	.21882	1.1298	1.5187	.052	26.2621	Bridgestone #1-2
816747	11-23-82	10313	HWFE	.14999	.7581	1.1969	.036	33.6201	Bridgestone #1-2
816748	11-24-82	10350	STEADY STATE						REGENERATION
816749	11-30-82	10439	HWFE	.14826	.7083	1.1842	.056	33.7411	Bridgestone #1-2
816750	11-30-82	10418	FTP	.23000	1.1491	1.5406	.089	26.3939	Bridgestone #1-2
816751	12-02-82	10490	FTP	.28233	1.0963	1.5809	.078	26.0502	Bridgestone #1-2
816752	12-02-82	10511	HWFE	.16803	.7304	1.1949	.035	33.3983	Bridgestone #1-2
816753	12-07-82	10551	STEADY STATE						REGENERATION
817283	12-08-82	10625	HWFE	.23114	.7713	1.2466	.058	33.3696	Bridgestone #1-2
817288	12-10-82	10677	FTP	.26832	1.0590	1.6297	.054	26.6023	Bridgestone #1-2
817289	12-10-82	10697	HWFE	.16204	.7604	1.3076	.038	33.7273	Bridgestone #1-2
817290	12-15-82	10733	STEADY STATE						REGENERATION
817291	12-16-82	10793	FTP	.28927	1.1184	1.5718	.088	26.5218	Bridgestone #1-2
817292	12-16-82	10814	HWFE	.17341	.6845	1.2124	.067	34.6567	Bridgestone #1-2
817293	12-28-82	10879	FTP	.30097	1.1583	1.6831	.117	26.3092	Bridgestone #1-2
817294	12-28-82	10900	HWFE	.20417	.8366	1.4138	.078	33.4767	Bridgestone #1-2
817295	12-30-82	10951	FTP	.26046	1.1621	1.6667	.153	26.1154	Bridgestone #1-2
817296	12-30-82	10971	HWFE	.19178	.8875	1.3140	.031	32.5098	Bridgestone #1-2

MEAN (COUNT): STANDARD DEVIATION:	FTP	.26666(9) .03226	1.1352(14) .0387	1.5630(14) .0692	.101(14) .034	26.4627(14)
MEAN (COUNT): STANDARD DEVIATION:	HWFE	.17703(11) .02690	.7792(16) .0942	1.2520(16) .0827	.056(16) .023	33.4952(16)

* EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM 4-15-82 THROUGH 6-24-83):

* RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:

FTP	.7172	1.0064	1.0730	.3166	.9777
HWFE	.6865	1.1069	1.0448	.2388	.9662

* Percent Change, that is (1 - Ratio) x 100 % :

FTP	28.3%	-0.6%	-7.3%	68.3%	2.2%
HWFE	31.4%	-10.7%	-4.5%	76.1%	3.4%

TEST NUMBER	TEST DATE	ODOM (km)	TEST CYCLE	EMISSIONS (g/mi) HC	CO	NOx	TP	F.E. (mpg)	TRAP TYPE/COMMENTS
817297	01-11-83	11022	FTP	.31105	1.1175	1.5618	.176	27.3730	Bridgestone BS2-1
817298	01-11-83	11043	HWFE	.24362	.7479	1.2046	.121	34.9741	Bridgestone BS2-1
817299	01-13-83	11093	FTP	.31453	1.1402	1.5409	.151	27.2233	Bridgestone BS2-1
817300	01-13-83	11115	HWFE	.21643	.7361	1.2461	.104	34.9867	Bridgestone BS2-1
817301	01-18-83	11167	FTP	.26321	1.0752	1.5518	.150	26.9535	Bridgestone BS2-1
817873	01-19-83	11203	FTP	.27799	1.1232	1.5776	.155	26.8037	Bridgestone BS2-1
817874	01-19-83	1223	HWFE	.22855	.7361	1.2307	.128	34.7429	Bridgestone BS2-1
817875	01-19-83	1259	HWFE	.21779	.7334	1.2059	.110	34.2806	Bridgestone BS2-1
817302	01-20-83	11315	STEADY STATE						REGENERATION
817876	01-25-83	11363	FTP	N/R	1.1406	1.4672	N/R	27.3763	Bridgestone BS2-1
817877	01-25-83	11383	HWFE	.19100	.7138	1.1784	.085	35.0019	Bridgestone BS2-1
817878	01-27-83	11434	FTP	.24421	1.0976	1.5671	.132	26.9556	Bridgestone BS2-1
817879	01-27-83	11471	HWFE	.18787	.7105	1.2304	.086	35.2455	Bridgestone BS2-1
817880	02-01-83	11521	FTP	.26972	1.1654	1.5531	.126	26.3148	Bridgestone BS2-1
817881	02-03-83	11600	STEADY STATE						REGENERATION
817882	02-04-83	11650	FTP	.27550	1.1278	1.4625	.154	27.4539	Bridgestone BS2-1
817891	02-04-83	11677	HWFE	.20748	.6933	1.1933	.096	35.3645	Bridgestone BS2-1
817892	02-11-83	11744	FTP	.26924	1.0671	1.4991	.133	26.8821	Bridgestone BS2-1
817895	03-01-83	11979	STEADY STATE						REGENERATION
817893	02-11-83	11765	HWFE	N/R	.7137	1.2086	.091	34.7884	Bridgestone BS2-1
817896	03-02-83	11994	FTP	.27163	1.1333	1.5012	.157	26.8039	Bridgestone BS2-1
817901	03-10-83	12100	FTP	.29003	1.1276	1.4822	.174	26.9418	Bridgestone BS2-1
817902	03-10-83	12121	HWFE	.23399	.8033	1.2065	.099	34.9685	Bridgestone BS2-1
817903	03-10-83	12158	HWFE	.21575	.8102	1.2213	.095	35.0941	Bridgestone BS2-1
817899	03-18-83	12282	FTP	.28943	1.1561	1.4277	.132	28.4447	Bridgestone BS2-1

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TEST      TEST      ODOM    TEST                   EMISSIONS (g/mi)
NUMBER    DATE      (km)    CYCLE     -------------------------------------------      F.E.
------  --------    -----   ----        HC          CO        NOx        TP          (mpg)     TRAP TYPE/COMMENTS
                                      -------     ------     ------     -----       -------    ---------------------------------

817900  03-25-83    12334   FTP         N/R       1.2280     1.6144     .160        26.5721    Bridgestone BS2-1
817904  03-29-83    12356   HWFE      .20158       .7594     1.2260     .089        35.3529    Bridgestone BS2-1
817905  03-29-83    12405   STEADY STATE                                                       REGENERATION
817906  03-30-83    12467   HWFE      .24393       .9143     1.3150     .100        35.5544    Bridgestone BS2-1
817907  03-30-83    12446   FTP       .29394      1.1667     1.5309     .155        27.2247    Bridgestone BS2-1
817908  03-31-83    12519   FTP       .29826      1.2179     1.4836     .125        27.0014    Bridgestone BS2-1
819179  03-31-83    12539   HWFE      .22378       .8281     1.2659     .086        35.0872    Bridgestone BS2-1
  ----------------------    ----      -------     ------     ------     -----       -------
  MEAN  (COUNT):            FTP       .28221(13)1.1389(15) 1.5214(15) .149(14) 27.0805(15)
     STANDARD DEVIATION:              .01977      .0446      .0514     .017

  MEAN  (COUNT):            HWFE      .21765(12) .7616(13) 1.2256(13) .099(13) 35.0312(13)
     STANDARD DEVIATION:              .01847      .0619      .0352     .014

                                                                            Nominally identical to Bridgestone #1.

*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  4-15-82 THROUGH  6-24-83):
*
*      RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                           FTP       .7590       1.0097     1.0444     .4671       1.0076
*
*                           HWFE      .8440       1.0819     1.0228     .4222       1.0105
*
*      Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                           FTP       24.1%       -1.0%      -4.4%      53.3%       -0.8%
*
*                           HWFE      15.6%       -8.2%      -2.3%      57.8%       -1.0%

819425  04-06-83    12612   HWFE      .25148       .6700      .9877     .108        40.7278*   Bridgestone Catalyzed
819426  04-06-83    12591   FTP       .32084      1.1195     1.4584     .159        27.6683    Bridgestone Catalyzed
819427  04-07-83    12664   FTP       .34104      1.2150     1.5189     .122        26.5688    Bridgestone Catalyzed
819428  04-07-83    12685   HWFE      .26628       .9745     1.3203     .078        34.2196    Bridgestone Catalyzed
819429  04-15-83    12847   FTP       .28944      1.1973     1.5262     .073        27.1498    Bridgestone Catalyzed
819430  04-15-83    12868   HWFE      .19990       .8961     1.2844     .063        34.7239    Bridgestone Catalyzed
819431  04-19-83    12919   FTP         N/R       1.2307     1.5595     .088        26.4266    Bridgestone Catalyzed
819432  04-19-83    12940   HWFE      .23163       .9960     1.2698     .060        33.5495    Bridgestone Catalyzed
819433  04-21-83    12992   FTP         N/R       1.2603     1.5235     .092        26.4186    Bridgestone Catalyzed
819434  04-21-83    13013   HWFE      .20929       .9926     1.2818     .060        33.5593    Bridgestone Catalyzed
 none   04-25-83    13102   STEADY STATE                                                       REGENERATION
819435  04-26-83    13163   STEADY STATE                                                       REGENERATION
819438  04-28-83    13285   FTP       .30564      1.2386     1.5125     .089        26.5743    Bridgestone Catalyzed
819440  04-28-83    13343   STEADY STATE                                                       REGENERATION
819441  04-29-83    13401   FTP       .30213      1.2179     1.7120     .111        26.6470    Bridgestone Catalyzed
819442  04-29-83    13422   HWFE      .24135       .8899     1.2181     .070        34.7104    Bridgestone Catalyzed
  ----------------------    ----      -------     ------     ------     -----       -------
  MEAN  (COUNT):            FTP       .31182(5) 1.2113(7)  1.5444(7)  .105(7)   26.7723(7)
     STANDARD DEVIATION:              .01980      .0451      .0797     .029

  MEAN  (COUNT):            HWFE(6)   .23332       .9032     1.2270     .073        35.0902
     STANDARD DEVIATION:              .02521      .1235      .1218     .018
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*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  6-21-83 THROUGH  6-24-83):
*
*      RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                             FTP      .7631      1.0365      1.0227      .2807       .9961
*
*                             HWFE     .7122      1.0911       .9526      .2616      1.0201
*
*      Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                             FTP     23.7%       -3.7%       -2.3%      71.9%        0.4%
*
*                             HWFE    28.8%       -9.1%        4.7%      73.8%       -2.0%
*

                                                    EMISSIONS (g/mi)
 TEST      TEST      ODOM    TEST      ---------------------------------------       F.E.
NUMBER     DATE      (km)    CYCLE        HC        CO         NOx        TP        (mpg)     TRAP TYPE/COMMENTS
------   --------    -----   ----      -------    ------     ------     -----     -------    --------------------------------

819444   05-04-83    13506   HWFE       .23478     .8266     1.1902      .084     34.7238    Bridgestone Catalyzed #2
819445   05-05-83    13559   FTP        .29996    1.1121     1.4158      .114     27.1575    Bridgestone Catalyzed #2
819446   05-05-83    13581   HWFE       .15919     .7317     1.1564      .071     34.3022    Bridgestone Catalyzed #2
819979   05-11-83    13792   HWFE       .14148     .7882     1.1691      .070     34.0683    Bridgestone Catalyzed #2
819980   05-12-83    13845   FTP        .25674    1.1807     1.4536      .091     26.9437    Bridgestone Catalyzed #2
819981   05-12-83    13865   HWFE       .13498     .7869     1.1485      .064     34.7689    Bridgestone Catalyzed #2
819982   05-17-83    13950   STEADY STATE                                                    REGENERATION
819983   05-18-83    13966   FTP        .26624    1.1417     1.4298      .156     27.0896    Bridgestone Catalyzed #2
819984   05-19-83    14004   FTP        .25817    1.0812     1.4475      .108     27.3900    Bridgestone Catalyzed #2
819985   05-19-83    14025   HWFE       .16388     .7793     1.1395      .066     35.6114    Bridgestone Catalyzed #2
819986   05-25-83    14144   FTP        .24117    1.1633     1.4523      .099     26.7371    Bridgestone Catalyzed #2
819987   05-25-83    14167   HWFE       .14053     .8470     1.1915      .053     34.5197    Bridgestone Catalyzed #2
819988   06-01-83    14287   FTP        .21715    1.1838     1.4871      .080     26.7402    Bridgestone Catalyzed #2
819989   06-01-83    11308   HWFE       .15447     .9807     1.2336      .052     34.2587    Bridgestone Catalyzed #2
819990   06-02-83    14387   STEADY STATE                                                    REGENERATION
819991   06-03-83    14410   FTP        .27732    1.2252     1.4569      .104     26.7917    Bridgestone Catalyzed #2
819992   06-03-83    14433   HWFE       .19689     .9331     1.2149      .074     34.7195    Bridgestone Catalyzed #2
819993   06-07-83    14565   FTP        .26486    1.2473     1.5199      .089     26.4441    Bridgestone Catalyzed #2
819994   06-07-83    14587   HWFE       .15893     .9173     1.2361      .053     34.5001    Bridgestone Catalyzed #2
819995   06-07-83    14624   STEADY STATE                                                    REGENERATION
819996   06-08-83    14677   FTP        .28564    1.1961     1.5039      .128     27.0064    Bridgestone Catalyzed #2
819997   06-08-83    14701   HWFE       .21245     .8952     1.2246      .067     34.9580    Bridgestone Catalyzed #2
819998   06-10-83    14752   FTP        .28532    1.1762     1.5868      .111     26.7251    Bridgestone Catalyzed #2
819999   06-10-83    14774   HWFE       .19361     .8887     1.3197      .066     34.6100    Bridgestone Catalyzed #2
820000   06-14-83    14825   FTP        .26863    1.2021     1.6169      .098     26.7265    Bridgestone Catalyzed #2
820637   06-14-83    14847   HWFE       .18883    1.0166     1.3761      .068     33.6722    Bridgestone Catalyzed #2
820638   06-15-83    14898   FTP        .26902    1.2418     1.6518      .090     26.1722    Bridgestone Catalyzed #2
820639   06-15-83    14920   HWFE       .16301     .9867     1.3595      .047     33.7985    Bridgestone Catalyzed #2
820640   06-15-83    14957   STEADY STATE                                                    REGENERATION
820641   06-16-83    15013   FTP        .33785    1.2696     1.5578      .133     26.5640    Bridgestone Catalyzed #2
820642   06-16-83    15034   HWFE       .24346     .8904     1.3126      .077     34.3581    Bridgestone Catalyzed #2
   ---------------------     ----      -------    ------     ------     -----     -------
  MEAN  (COUNT):             FTP (13)  .27139     1.1862     1.5062      .108     26.8032
     STANDARD DEVIATION:               .02886      .0539      .0757      .021

  MEAN  (COUNT):             HWFE(14)  .17761      .8763     1.2337      .065     34.4839
     STANDARD DEVIATION:               .03475      .0867      .0785      .011
```

```
*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  6-21-83 THROUGH  6-24-83):
*
*     RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                                FTP     .6642     1.0151      .9974     .2888      .9973
*
*                                HWFE    .5422     1.0586      .9578     .2330     1.0025
*
*     Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                                FTP    33.6%      -1.5%       0.3%     71.1%       0.3%
*
*                                HWFE   45.8%      -5.9%       4.2%     76.7%      -0.3%
*

                                              EMISSIONS (g/mi)
TEST     TEST      ODOM    TEST    ---------------------------------------     F.E.
NUMBER   DATE      (km)    CYCLE      HC         CO         NOx       TP      (mpg)    TRAP TYPE/COMMENTS
------ --------   -----    ----    -------    ------     ------     -----    -------   ----------------------------------

820643  06-21-83   15127   HWFE     .34311     .8429     1.2914      .259    34.3304   Baseline
820644  06-22-83   15174   HWFE     .31210     .8127     1.2849      .299    34.4636   Baseline
820645  06-23-83   15220   FTP      .40860    1.1733     1.5211      .377    26.7689   Baseline
820646  06-24-83   15246   FTP       N/R      1.1639     1.4992      .370    26.9838   Baseline
----------------------     ----    -------    ------     ------     -----    -------
  MEAN  (COUNT):           FTP      .40860(1) 1.1686(2)  1.5101(2)  .374(2)  26.8759(2)
     STANDARD DEVIATION:             N/A       .0066      .0155     .005

  MEAN  (COUNT):           HWFE(2)  .32760     .8278     1.2881      .279    34.3974
     STANDARD DEVIATION:            .02193     .0214      .0046     .028
```

Appendix A-4

Emissions Test Data on VW Rabbit

VEHICLE I.D. 071-612 (1982 VW DIESEL RABBIT)

TEST NUMBER	TEST DATE	ODOM (mi)	TEST CYCLE	EMISSIONS (g/mi)				F.E. (mpg)	TRAP TYPE/COMMENTS
				HC	CO	NOx	TP		
812147	01-26-82	4276	FTP	N/R	N/R	N/R	N/R	N/R	Dummy without JM regeneration system -- VOID
812137	01-28-82	4299	FTP	.21231	.8758	.7965	.158	45.6201	Dummy without JM regeneration system
812138	01-28-82	4310	HWFE	.07192	.3048	.5800	.094	62.1614	Dummy without JM regeneration system
812142	02-02-82	4373	FTP	.25686	.9576	.7877	.198	44.5675	Dummy without JM regeneration system
812143	02-02-82	4385	HWFE	.08392	.3531	.5794	.098	62.8849	Dummy without JM regeneration system
812145	02-03-82	4413	FTP	.21196	.8985	.7926	.179	47.7543	Dummy without JM regeneration system
812146	02-04-82	4428	FTP	N/R	N/R	N/R	N/R	N/R	Dummy without JM regeneration system -- VOID
812213	02-05-82	4485	FTP	.23310	.9227	.7988	.167	46.0059	Dummy without JM regeneration system
MEAN (COUNT):			FTP (4)	.22856	.9136	.7939	.176	45.9580	Fuel Economy mean is harmonic; all other means are arithmetic.
STANDARD DEVIATION:				.02130	.0350	.0049	.017		
MEAN (COUNT):			HWFE(2)	.07792	.3290	.5797	.096	62.5195	
STANDARD DEVIATION:				.00849	.0342	.0004	.003		
									Car shipped to JM.
813908	06-08-82	5965	FTP	.51607	1.2378	.7418	.242	46.7670	Baseline with JM regeneration system
813909	06-08-82	5977	HWFE	.21400	.4997	.5803	.122	65.0359	Baseline with JM regeneration system
813911	06-10-82	6005	FTP	.51835	1.1515	.7460	.259	46.3695	Baseline with JM regeneration system
813912	06-10-82	6008	HWFE	.25296	.4868	.5802	.121	64.1714	Baseline with JM regeneration system
813914	06-15-82	6055	HWFE	.24944	.5420	.5831	.127	61.8071	Baseline with JM regeneration system
813916	06-16-82	6085	FTP	.43189	1.1113	.7369	.211	46.6535	Baseline with JM regeneration system
813917	06-16-82	6096	HWFE	.20987	.4674	.5616	.121	63.0454	Baseline with JM regeneration system
813919	06-16-82	6124	HWFE	.19945	.4482	.5591	.111	63.4646	Baseline with JM regeneration system
813922	06-18-82	6180	FTP	.36762	1.0158	.7453	.205	47.6016	Baseline with JM regeneration system
813923	06-22-82	6383	FTP	.40245	1.0279	.7583	.226	46.4874	Baseline with JM regeneration system
814354	06-23-82	6196	FTP	.33977	1.0238	.7506	.215	47.1798	Baseline with JM regeneration system
814227	06-24-82	6207	HWFE	.14731	.4464	.5710	.117	62.3620	Baseline with JM regeneration system
MEAN (COUNT):			FTP (6)	.42936	1.0947	.7465	.226	46.8384	
STANDARD DEVIATION:				.07484	.0891	.0074	.021		
MEAN (COUNT):			HWFE(6)	.21217	.4818	.5726	.120	63.2951	
STANDARD DEVIATION:				.03855	.0362	.0103	.005		
814229	07-02-82	6253	FTP	.06687	.1524	.7756	.051	44.1566	Johnson Matthey JM-13
814230	07-07-82	6265	HWFE	-.00526	.0000	.6052	.042	57.4956	Johnson Matthey JM-13
814232	07-07-82	6296	HWFE	.00662	.0000	.6096	.065	58.1401	Johnson Matthey JM-13
MEAN (COUNT):			FTP (1)	.06687	.1524	.7756	.051	44.1566	
MEAN (COUNT):			HWFE(2)	.00331	.0000	.6074	.054	57.8168	
STANDARD DEVIATION:				.00468	.0000	.0031	.016		

Regeneration system deactivated to eliminate off-cycle fuel injection during non-regeneration cycles.

TEST NUMBER	TEST DATE	ODOM (mi)	TEST CYCLE	EMISSIONS (g/mi) HC	CO	NOx	TP	F.E. (mpg)	TRAP TYPE/COMMENTS
814234	07-08-82	6335	FTP	.26131	.9577	.7671	.203	46.3936	Baseline
814235	07-08-82	6347	HWFE	N/R	N/R	N/R	N/R	N/R	Baseline -- VOID
814237	07-13-82	6384	FTP	.28406	.9250	.7688	.180	47.0348	Baseline
814238	07-13-82	6395	HWFE	.09633	.3338	.5734	.102	63.6692	Baseline
814240	07-13-82	6423	HWFE	.09974	.3686	.5930	.110	62.8530	Baseline
MEAN (COUNT):			FTP (2)	.27268	.9414	.7680	.192	46.7115	
STANDARD DEVIATION:				.01609	.0231	.0012	.016		
MEAN (COUNT):			HWFE(2)	.09804	.3512	.5832	.106	63.2591	
STANDARD DEVIATION:				.00241	.0246	.0139	.006		
814242	07-21-82	6460	FTP	N/R	N/R	N/R	N/R	N/R	Johnson Matthey JM-13 -- VOID
814243	07-21-82	6473	HWFE	.00065	.0000	.5866	.065	58.4806	Johnson Matthey JM-13
814892	07-22-82	6505	FTP	.09728	.1083	.7823	.038	43.0302	Johnson Matthey JM-13
814893	07-22-82	6540	HWFE	.00403	.0000	.5947	.149	57.8130	Johnson Matthey JM-13
814895	07-23-82	6571	STEADY STATE						REGENERATION
814896	07-27-82	6594	FTP	.08563	.2633	.8058	.059	43.1761	Johnson Matthey JM-13
814911	07-27-82	6604	HWFE	.00179	.0000	.6135	.062	60.5680	Johnson Matthey JM-13
814913	07-28-82	6633	FTP	.11514	.2435	.8010	.037	43.7214	Johnson Matthey JM-13
814914	07-28-82	6648	HWFE	.00438	.0000	.6155	.097	56.8441	Johnson Matthey JM-13
814897	08-03-82	6715	STEADY STATE						REGENERATION
814898	08-04-82	6724	FTP	.05057	.1249	.8001	.041	43.6074	Johnson Matthey JM-13
814916	08-04-82	6736	HWFE	.00010	.0000	.5829	.039	59.8578	Johnson Matthey JM-13
814918	08-12-82	6786	FTP	.03746	.1128	.7940	.050	43.6187	Johnson Matthey JM-13
814919	08-12-82	6799	HWFE	.00463	.0002	.5974	.060	59.1563	Johnson Matthey JM-13
814921	08-13-82	6849	STEADY STATE						REGENERATION
814922	08-17-82	6859	FTP	.05603	.2016	.7887	.079	44.7304	Johnson Matthey JM-13
814925	08-18-82	6961	FTP	.05147	.1330	.7830	.038	43.6045	Johnson Matthey JM-13
814926	08-19-82	6999	STEADY STATE						UNSUCCESSFUL REGENERATION
815489	08-20-82	7016	STEADY STATE						REGENERATION
815490	08-24-82	7025	FTP	N/R	N/R	N/R	N/R	N/R	Johnson Matthey JM-13 -- VOID
815491	08-24-82	7037	HWFE	.00830	.0000	.5568	.042	60.2029	Johnson Matthey JM-13
815493	08-25-82	7068	FTP	.10051	.1887	.7621	.031	44.3161	Johnson Matthey JM-13
815494	08-25-82	7082	HWFE	.00617	.0000	.5665	.056	60.5635	Johnson Matthey JM-13
815496	08-26-82	7126	STEADY STATE						REGENERATION
815497	08-27-82	7135	FTP	N/R	.2533	.7689	.031	44.6739	Johnson Matthey JM-13
815498	08-27-82	7148	HWFE	.00573	.0000	.5630	.041	60.2052	Johnson Matthey JM-13
815500	08-31-82	7198	STEADY STATE						REGENERATION
815502	09-03-82	7251	HWFE	N/R	.0000	.5647	.029	60.5612	Johnson Matthey JM-13
815504	09-08-82	7290	FTP	N/R	.1761	.7999	.036	43.9973	Johnson Matthey JM-13
815505	09-08-82	7303	HWFE	N/R	.0000	.5857	.057	58.8111	Johnson Matthey JM-13
815507	09-09-82	7337	STEADY STATE						REGENERATION
815508	09-10-82	7357	STEADY STATE						REGENERATION
815509	09-21-82	7482	FTP	N/R	.2425	.7589	.047	44.1113	Johnson Matthey JM-13
815907	09-21-82	7495	HWFE	N/R	.0000	.5627	.041	59.4967	Johnson Matthey JM-13
815909	09-22-82	7526	HWFE	.00623	.0000	.5739	.053	59.1552	Johnson Matthey JM-13
815911	09-24-82	7558	FTP	.07652	.1695	.7729	.038	43.7648	Johnson Matthey JM-13
none	09-27-82	7587	STEADY STATE						REGENERATION

TEST NUMBER	TEST DATE	ODOM (mi)	TEST CYCLE	EMISSIONS (g/mi) HC	CO	NOx	TP	F.E. (mpg)	TRAP TYPE/COMMENTS
815912	09-29-82	7596	FTP	.09332	.2600	.8042	.039	43.3560	Johnson Matthey JM-13
815913	09-29-82	7609	HWFE	.00462	.0004	.6011	.046	57.4853	Johnson Matthey JM-13
815915	09-30-82	7641	FTP	N/R	.1672	.8688	.032	42.6701	Johnson Matthey JM-13
816265	10-01-82	7654	HWFE	N/R	.0000	.6122	.081	56.2121	Johnson Matthey JM-13
none	10-05-82	7710	STEADY STATE						REGENERATION
816267	10-07-82	7710	FTP	N/R	.1886	.7971	.033	44.3326	Johnson Matthey JM-13
816268	10-07-82	7723	HWFE	N/R	.0000	.5835	.033	59.4989	Johnson Matthey JM-13
816264	10-08-82	7754	HWFE	N/R	.0085	.5856	.061	57.8005	Johnson Matthey JM-13
816397	10-14-82	7797	FTP	.09537	.0847	.8211	.035	41.8023	Johnson Matthey JM-13
816398	10-14-82	7811	STEADY STATE						REGENERATION
816399	10-15-82	7832	FTP	N/R	N/R	N/R	N/R	N/R	Johnson Matthey JM-13 -- VOID
816400	10-15-82	7845	HWFE	N/R	.0000	.5928	.043	58.4561	Johnson Matthey JM-13
816402	10-20-82	7887	FTP	N/R	.1774	.8096	.033	42.8383	Johnson Matthey JM-13
816403	10-20-82	7900	HWFE	N/R	.0000	.5966	.099	57.8036	Johnson Matthey JM-13
816405	10-26-82	7938	STEADY STATE						REGENERATION
816406	10-26-82	7959	FTP	N/R	.1870	.8064	.039	43.0172	Johnson Matthey JM-13
816407	10-27-82	7972	HWFE	N/R	.0054	.5908	.037	57.4730	Johnson Matthey JM-13
816409	11-02-82	8020	STEADY STATE						REGENERATION
816410	11-03-82	8030	FTP	N/R	.3363	.7673	.039	44.6636	Johnson Matthey JM-13
816411	11-03-82	8042	HWFE	N/R	.0037	.5576	.029	61.6550	Johnson Matthey JM-13
816413	11-05-82	8073	FTP	N/R	.2241	.8139	.043	42.2980	Johnson Matthey JM-13
816415	11-16-82	8108	HWFE	.02664	.0114	.5959	.058	57.7839	Johnson Matthey JM-13
816416	11-17-82	8129	STEADY STATE						REGENERATION
817035	11-18-82	8163	FTP	.10472	.3246	.8410	.036	43.8923	Johnson Matthey JM-13
817047	11-19-82	8209	FTP	.10464	.2531	.8419	.032	41.7510	Johnson Matthey JM-13
817048	11-19-82	8219	HWFE	.01756	.0121	.6242	.088	55.8887	Johnson Matthey JM-13
817059	11-24-82	8250	STEADY STATE						REGENERATION
817060	11-30-82	8271	FTP	.08956	.2714	.8235	.032	42.9886	Johnson Matthey JM-13
817061	11-30-82	8283	HWFE	.00632	.0002	.6088	.046	56.2141	Johnson Matthey JM-13
817062	12-01-82	8342	FTP	.08409	.1938	.8220	.058	41.4384	Johnson Matthey JM-13
817063	12-01-82	8355	HWFE	.02122	.0042	.6222	.187	53.8213	Johnson Matthey JM-13
817064	12-01-82	8405	STEADY STATE						REGENERATION
817065	12-07-82	8435	HWFE	.00734	.0000	.6193	.031	55.9042	Johnson Matthey JM-13
817066	12-08-82	8466	FTP	.07915	.1978	.9015	.031	40.7742	Johnson Matthey JM-13
817067	12-08-82	8478	HWFE	.00790	.0004	.6499	.086	55.2957	Johnson Matthey JM-13
817068	12-15-82	8517	FTP	.06712	.1438	.9247	.036	39.9942	Johnson Matthey JM-13
817069	12-15-82	8530	STEADY STATE						REGENERATION
817070	12-16-82	8556	FTP	.05168	.1576	.8765	.028	41.2952	Johnson Matthey JM-13
817071	12-16-82	8569	HWFE	.00615	.0000	.6268	.049	54.1212	Johnson Matthey JM-13
817072	12-21-82	8607	FTP	N/R	.1211	.8851	.032	40.6453	Johnson Matthey JM-13
817073	12-21-82	8619	HWFE	.01147	.0000	.6498	.119	54.1166	Johnson Matthey JM-13
817425	12-28-82	8680	STEADY STATE						REGENERATION
817426	12-29-82	8689	FTP	.10820	.2988	.8681	.033	40.7335	Johnson Matthey JM-13
817427	12-29-82	8702	HWFE	.00829	.0000	.6282	.037	55.9033	Johnson Matthey JM-13
817428	12-30-82	8733	FTP	.10473	.2066	.8545	.026	41.4218	Johnson Matthey JM-13
817429	12-30-82	8745	HWFE	.01078	.0000	.6501	.089	54.6984	Johnson Matthey JM-13
817430	01-04-83	8779	STEADY STATE						REGENERATION
MEAN (COUNT):			FTP	.08266(20)	.2004(30)	.8182(30)	.039(30)	42.8339(30)	
STANDARD DEVIATION:				.02298	.0645	.0429	.011		
MEAN (COUNT):			HWFE	.00811(21)	.0015(31)	.5987(31)	.065(31)	57.7234(31)	
STANDARD DEVIATION:				.00655	.0034	.0270	.036		

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*  EFFECTIVENESS OF ABOVE TRAP RELATIVE TO TEST DATA WITH DUMMY TRAP (FROM  7-08-82 THROUGH  4-05-83):
*
*      RATIO OF TEST DATA WITH TRAP TO TEST DATA WITH DUMMY TRAP:
*
*                                FTP     .2085      .1873     1.0124     .2009       .9490
*
*                                HWFE    .0388      .0033      .9852     .5945       .9457
*
*      Percent Change, that is  ( 1 - Ratio ) x 100 % :
*
*                                FTP    79.2%      81.3%      -1.2%     79.9%        5.1%
*
*                                HWFE   96.1%      99.7%       1.4%     40.5%        5.4%
*

                                                    EMISSIONS (g/mi)
TEST      TEST      ODOM    TEST     -------------------------------------          F.E.
NUMBER    DATE      (mi)    CYCLE       HC         CO        NOx        TP          (mpg)    TRAP TYPE/COMMENTS
------  --------    -----   ----     -------    ------     ------      -----       -------   --------------------------------

817431  01-07-83    8807    FTP        N/R      1.1849      .8421      .184       44.5058   Baseline
817432  01-07-83    8818    HWFE       N/R        N/R        N/R        N/R         N/R      Baseline -- VOID
817433  01-11-83    8846    FTP      .45328     1.0880      .8300      .184       45.1957   Baseline
817434  01-11-83    8867    HWFE     .31737      .5146      .6039      .105       60.2808   Baseline
817435  01-12-83    8895    FTP      .55271     1.1041      .8355      .189       45.1290   Baseline
817436  01-12-83    8906    HWFE     .28734      .5207      .6344      .110       60.6687   Baseline
817437  01-18-83    8980    STEADY STATE                                                   Johnson Matthey JM-13 -- REGENERATION
817438  04-01-83    9017    FTP      .43102     1.1029      .8056      .215       44.2243   Baseline
817439  04-05-83    9036    FTP        N/R      1.1272      .8077      .203       43.6468   Baseline
817440  04-05-83    9047    HWFE     .22587      .5088      .6157      .121       60.7445   Baseline
817441  04-05-83    9082    HWFE     .22726      .4900      .6256      .109       58.3175   Baseline
  ----------------------    ----     -------    ------     ------      -----       -------
  MEAN  (COUNT):            FTP      .47900(3) 1.1214(5)  .8242(5)   .195(5)     44.5335(5)
     STANDARD DEVIATION:             .06480      .0382      .0166      .014

  MEAN  (COUNT):            HWFE(4)  .26446      .5085      .6199      .111       59.9880
     STANDARD DEVIATION:             .04545      .0133      .0131      .007
```

Appendix B

Emissions Measured During Regeneration Cycles

APPENDIX B-1

EMISSIONS MEASURED DURING 60 MPH STEADY-STATE REGENERATIONS

VEHICLE I.D. 11511412019885 (1975 MERCEDES BENZ 300D)

TEST NUMBER	BAG #	TEST DATE	ODOM (mi)	------ EMISSIONS (g/mi) ------ HC	CO	NOx	TP	F.E. (mpg)	TRAP	THROTTLE CONDITION
797445	1	04-13-79	30497	.069	.573	2.390	.421	24.2	DUMMY TRAP	Unthrottled Inlet
797445	2	04-13-79	30497	.073	.428	2.293	.241	24.4	DUMMY TRAP	Throttled Inlet @ 7" Hg of vacuum
797446	1	04-13-79	30521	.046	.400	2.158	.164	24.0	DUMMY TRAP	Throttled Inlet @ 9" Hg of vacuum
797446	2	04-13-79	30521	.059	.403	2.105	.170	23.3	DUMMY TRAP	Throttled Inlet @ 10" Hg of vacuum
799476	1	10-15-79	35227	.060	.430	1.943	.294	25.0	DUMMY TRAP	Throttled Inlet @ 9" Hg for 8 min
799476	2	10-15-79	35227	.070	.481	2.009	.358	29.0	DUMMY TRAP	Unthrottled Inlet for 4 min
799479	1	10-16-79	35307	N/R	.406	1.990	.249	24.7	DUMMY TRAP	Throttled Inlet @ 9" Hg for 8 min
799479	2	10-16-79	35307	N/R	.491	2.088	.363	28.1	DUMMY TRAP	Unthrottled Inlet for 4 min
799480	1	10-19-79	35433	.067	.689	1.783	.155	28.0	ICI Saffil	Throttled Inlet @ 9" Hg for 8 min
799480	2	10-19-79	35433	.060	.690	1.768	.329	31.1	ICI Saffil	Unthrottled Inlet for 4 min
799483	1	10-25-79	35790	.051	1.302	1.897	.160	24.9	ICI Saffil	Throttled Inlet @ 9" Hg for 8 min
799483	2	10-25-79	35790	.042	.827	2.055	.303	27.7	ICI Saffil	Unthrottled Inlet for 4 min
802070	1	04-08-80	39363	N/R	6.077	1.599	.221	22.0	Corning 12" (#1) non-catalyzed	Throttled Inlet @ 9" Hg for 8 min
802070	2	04-08-80	39363	N/R	1.223	1.901	N/R	27.7		Unthrottled Inlet for 4 minutes
810787	1	10-09-81	42458	.091	.006	1.889	3.019	23.2	Corning 12" w UOP Coating	Throttled Inlet @ 9" Hg for 8 min
810787	2	10-09-81	42458	.066	.038	1.568	.998	33.0		Unthrottled Inlet for 4 minutes
811170	1	10-21-81	42619	.070	.006	1.894	1.509	22.8	Corning 12" w UOP Coating	Throttled Inlet @ 9" Hg for 8 min
811170	2	10-21-81	42619	.066	.035	2.042	1.930	26.8		Unthrottled Inlet for 4 minutes
811764	1	12-09-81	43264	.021	1.979	1.852	.113	23.0	NGK #2	Throttled Inlet @ 9" Hg for 8 min
811764	2	12-09-81	43264	.014	.592	2.121	.104	26.0	NGK #2	Unthrottled Inlet for 4 minutes
811823	1	12-23-81	43547	.017	4.918	1.681	.081	21.8	NGK #2	Throttled Inlet @ 9" Hg for 8 min
811823	2	12-23-81	43547	.013	.806	2.132	.115	25.9	NGK #2	Unthrottled Inlet for 4 minutes
811824	1	01-06-82	43590	.017	3.158	1.668	N/R	22.0	NGK #2	Throttled Inlet @ 9" Hg for 8 min
811824	2	01-06-82	43590	.015	2.230	2.089	N/R	25.5	NGK #2	Unthrottled Inlet for 4 minutes
none	1	01-20-82	43819	Not Measured					NGK #2	

APPENDIX B-1 (Con't)

EMISSIONS MEASURED DURING 60 MPH STEADY-STATE REGENERATIONS

VEHICLE I.D. 11511412019885 (1975 MERCEDES BENZ 300D)

TEST NUMBER	BAG #	TEST DATE	ODOM (mi)	------ EMISSIONS (g/mi) ------ HC	CO	NOx	TP	F.E. (mpg)	TRAP	THROTTLE CONDITION
812777	1	04-14-82	44665	.045	3.172	1.622	.115	22.2	Corning 12" (#2)	Throttled Inlet @ 9" Hg for 8 min
812777	2	04-14-82	44665	.030	.793	2.092	.149	25.8	non-catalyzed	Unthrottled Inlet for 4 min
812784	1	04-29-82	44805	.050	6.705	1.596	.077	21.2	Corning 12" (#2)	Throttled Inlet @ 9" Hg for 8 min
812784	2	04-29-82	44805	.037	.842	2.107	.121	25.7	non-catalyzed	Unthrottled Inlet for 4 min
813611	1	06-17-82	45149	.046	.719	1.799	.096	24.7	NGK #3	Throttled Inlet @ 9" Hg for 8 min
813611	2	06-17-82	45149	.040	.499	.991	.152	26.8	NGK #3	Unthrottled Inlet for 4 min
813612	1	06-22-82	45206	.035	1.478	1.545	.084	23.5	NGK #3	Throttled Inlet @ 9" Hg for 8 min
813612	2	06-22-82	45206	.044	.578	1.969	N/R	27.4	NGK #3	Unthrottled Inlet for 4 min
814760	1	07-23-82	45471	.096	4.721	1.475	.306	21.8	NGK #3	Throttled Inlet @ 9" Hg for 8 min
814760	2	07-23-82	45471	.102	.525	2.027	.299	26.0	NGK #3	Unthrottled Inlet for 4 min
814749	1	08-04-82	45486	.037	2.883	1.406	.241	22.9	NGK #3	Throttled Inlet @ 9" Hg for 8 min
814749	2	08-04-82	45486	.039	.629	1.906	.291	27.0	NGK #3	Unthrottled Inlet for 4 min
814776	1	09-21-82	46064	N/R	2.959	1.067	.134	30.5	NGK #4	Throttled Inlet @ 9" Hg for 8 min
814776	2	09-21-82	46064	N/R	.384	.940	.116	N/R	NGK #4	Unthrottled Inlet for 4 min
816071	1	09-28-82	46147	.040	4.727	1.359	.084	23.2	NGK #4	Throttled Inlet @ 9" Hg for 8 min
816071	2	09-28-82	46147	.024	.697	1.874	.136	27.5	NGK #4	Unthrottled Inlet for 4 min
816078	1	10-07-82	46253	N/R	4.246	1.513	.109	21.9	NGK #4	Throttled Inlet @ 9" Hg for 8 min
816078	2	10-07-82	46253	N/R	.981	2.000	.170	25.7	NGK #4	Unthrottled Inlet for 4 min
816498	1	10-26-82	46447	N/R	5.231	1.373	.141	23.3	NGK #4	Throttled Inlet @ 9" Hg for 8 min
816498	2	10-26-82	46447	N/R	.739	1.896	.110	27.0	NGK #4	Unthrottled Inlet for 4 min
817116	1	12-01-82	46865	.169	3.445	1.481	.129	22.7	NGK #4-2	Throttled Inlet @ 9" Hg for 8 min
817116	2	12-01-82	46865	.196	1.331	2.068	.336	25.7	NGK #4-2	Unthrottled Inlet for 4 min
817121	1	12-08-82	46989	.023	4.085	1.476	.042	22.5	NGK #4-2	Throttled Inlet @ 9" Hg for 8 min
817121	2	12-08-82	46989	.025	.940	2.001	.091	26.1	NGK #4-2	Unthrottled Inlet for 4 min

APPENDIX B-2

EMISSIONS MEASURED DURING 60 MPH STEADY-STATE REGENERATIONS

VEHICLE I.D. K-LS110-SEMFSY (1981 TOYOTA CROWN SUPER DELUXE)

TEST NUMBER	BAG #	TEST DATE	ODOM (km)	HC	CO	NOx	TP	F.E. (mpg)	TRAP	THROTTLE CONDITION
				------ EMISSIONS	(g/mi)	------				
811576	1	11-18-81	4053	.141	7.090	1.181	.126	24.7	NGK #1	Throttled Inlet @ 9" Hg vac for 8 min
811576	2	11-18-81	4053	.149	1.968	1.144	.125	33.2	NGK #1	Unthrottled Inlet for 4 minutes
811788	1	12-11-81	4763	.139	8.769	1.145	N/R	23.9	NGK #1	Throttled Inlet @ 9" Hg vac for 8 min
811788	2	12-11-81	4763	.195	1.410	1.355	N/R	30.5	NGK #1	Unthrottled Inlet for 4 minutes
811986	1	01-08-82	5595	.139	8.015	1.216	.226	24.5	NGK #1	Throttled Inlet @ 9" Hg vac for 8 min
811986	2	01-08-82	5595	.175	2.849	1.324	.218	29.3	NGK #1	Unthrottled Inlet for 4 minutes
812001	1	03-09-82	6001	.219	1.438	1.339	.299	26.1	Dummy	Throttled Inlet @ 9.5" Hg for 1.25 min & Throttled Inlet @ 7.5" for 6.75 min
812001	2	03-09-82	6001	.224	.895	1.451	.365	28.7	Dummy	Unthrottled Inlet for 4 min
812002	1	03-10-82	6073	.169	1.279	1.282	.209	25.3	Dummy	Throttled Inlet @ 8.2" Hg for 8 min
812002	2	03-10-82	6073	.225	.921	1.410	.271	28.9	Dummy	Unthrottled Inlet for 4 min
812003	1	03-10-82	6107	.220	4.037	1.203	.411	24.4	Dummy	Throttled Inlet @ 9" Hg for 8 min
812003	2	03-10-82	6107	.198	.889	1.401	.231	28.6	Dummy	Unthrottled Inlet for 4 min
814226	1	06-22-82	8015	.137	1.895	1.303	.689	26.4	Toyota Foam Non-cat	Throttled Inlet @ 9" Hg for 8 min
814226	2	06-22-82	8015	.159	.987	1.508	.469	29.9	Toyota Foam Non-cat	Unthrottled Inlet for 4 min
814265	1	08-19-82	8880	.126	2.332	1.274	1.074	27.0	Toyota Foam Non-cat	Throttled Inlet @ 9" Hg for 8 min
814265	2	08-19-82	8880	.131	.965	1.365	.913	30.4	Toyota Foam Non-cat	Unthrottled Inlet for 4 min
814803	1	10-26-82	9599	N/R	1.857	1.312	.161	27.7	Bridgestone #1-2	Throttled Inlet @ 9" Hg for 8 min
814803	2	10-26-82	9599	N/R	1.095	1.308	.128	31.2	Bridgestone #1-2	Unthrottled Inlet for 4 min
816737	1	11-02-82	9800	N/R	9.266	1.137	.210	26.9	Bridgestone #1-2	Throttled Inlet @ 9" Hg for 8 min
816737	2	11-02-82	9800	N/R	1.176	1.375	.204	30.9	Bridgestone #1-2	Unthrottled Inlet for 4 min
816743	1	11-17-82	10110	N/R	1.929	1.300	.126	27.1	Bridgestone #1-2	Throttled Inlet @ 9" Hg for 8 min
816743	2	11-17-82	10110	N/R	.835	1.084	.206	37.5	Bridgestone #1-2	Unthrottled Inlet for 4 min
816748	1	11-24-82	10350	N/R	1.837	1.240	.081	27.5	Bridgestone #1-2	Throttled Inlet @ 9" Hg for 8 min
816748	2	11-24-82	10350	N/R	1.046	1.325	.149	30.4	Bridgestone #1-2	Unthrottled Inlet for 4 min
816753	1	12-07-82	10551	.113	1.989	1.341	.072	27.1	Bridgestone #1-2	Throttled Inlet @ 9" Hg for 8 min
816753	2	12-07-82	10551	.178	1.056	1.401	.110	30.2	Bridgestone #1-2	Unthrottled Inlet for 4 min
817290	1	12-15-82	10733	.102	2.581	1.267	.114	26.1	Bridgestone #1-2	Throttled Inlet @ 9" Hg for 8 min
817290	2	12-15-82	10733	.176	1.040	1.433	.182	30.1	Bridgestone #1-2	Unthrottled Inlet for 4 min

APPENDIX B-2 (Con't)

EMISSIONS MEASURED DURING 60 MPH STEADY-STATE REGENERATIONS

VEHICLE I.D. K-LS110-SEMFSY (1981 TOYOTA CROWN SUPER DELUXE)

TEST NUMBER	BAG #	TEST DATE	ODOM (mi)	EMISSIONS (g/mi) HC	CO	NOx	TP	F.E. (mpg)	TRAP	THROTTLE CONDITION
817302	1	01-20-83	11315	.173	2.543	1.291	.250	26.8	Bridgestone BS2-1	Throttled Inlet @ 9" Hg for 8 min
817302	2	01-20-83	11315	.225	1.267	1.429	.662	30.3	Bridgestone BS2-1	Unthrottled Inlet for 4 min
817881	1	02-03-83	11600	.192	2.263	1.419	.081	23.4	Bridgestone BS2-1	Throttled Inlet @ 9" Hg for 8 min
817881	2	02-03-83	11600	.171	1.048	1.317	.559	31.3	Bridgestone BS2-1	Unthrottled Inlet for 4 min
817895	1	03-01-83	11979	N/R	4.161	1.409	.299	26.5	Bridgestone BS2-1	Throttled Inlet @ 9" Hg for 8 min
817895	2	03-01-83	11979	N/R	1.290	1.528	.455	28.9	Bridgestone BS2-1	Unthrottled Inlet for 4 min
817905	1	03-29-83	12405	.142	1.838	1.278	.303	28.9	Bridgestone BS2-1	Throttled Inlet @ 9" Hg for 8 min
817905	2	03-29-83	12405	.191	1.135	1.385	1.172	31.7	Bridgestone BS2-1	Unthrottled Inlet for 4 min
none	1	04-25-83	13102	Not Measured					Bridg. Foam Cat.	
819435	1	04-26-83	13163	.201	1.513	1.687	.092	29.1	Bridg. Foam Cat.	Throttled Inlet @ 9" Hg for 8 min
819435	2	04-26-83	13163	.276	1.271	1.763	.115	30.4	Bridg. Foam Cat.	Unthrottled Inlet for 4 min
819440	1	04-28-83	13343	.145	1.438	1.339	.088	28.7	Bridg. Foam Cat.	Throttled Inlet @ 9" Hg for 8 min
819440	2	04-28-83	13343	.257	1.209	1.412	.108	30.2	Bridg. Foam Cat.	Unthrottled Inlet for 4 min
819982	1	05-17-83	13950	.133	1.053	1.259	.127	28.7	Bridg. Foam Cat #2	Throttled Inlet @ 9" Hg for 8 min
819982	2	05-17-83	13950	.197	1.175	1.345	.136	30.4	Bridg. Foam Cat #2	Unthrottled Inlet for 4 min
819990	1	06-02-83	14387	.095	1.167	1.257	.137	28.4	Bridg. Foam Cat #2	Throttled Inlet @ 7" Hg for 8 min
819990	2	06-02-83	14387	.159	1.073	1.339	.150	30.5	Bridg. Foam Cat #2	Unthrottled Inlet for 4 min
819995	1	06-07-83	14624	.111	1.221	1.261	.164	27.9	Bridg. Foam Cat #2	Throttled Inlet @ 8" Hg for 8 min
819995	2	06-07-83	14624	.190	1.236	1.367	.181	30.5	Bridg. Foam Cat #2	Unthrottled Inlet for 4 min
820640	1	06-15-83	14957	.130	1.384	1.485	.223	27.6	Bridg. Foam Cat #2	Throttled Inlet @ 8" Hg for 8 min
820640	2	06-15-83	14957	.197	1.205	1.618	.220	30.4	Bridg. Foam Cat #2	Unthrottled Inlet for 4 min

APPENDIX B-3

EMISSIONS MEASURED DURING 50 MPH STEADY-STATE REGENERATIONS

VEHICLE I.D. 071-612 (1982 VW RABBIT)

			------ EMISSIONS (g/mi) ------						
TEST NUMBER	TEST DATE	ODOM (mi)	HC	CO	NOx	TP	F.E. (mpg)	TRAP	Distance (miles) for Regen Cycle
814895	07-23-82	6571	.385	0.523	0.406	6.032	48.3	JM-13 Trap	2.775
814897	08-03-82	6715	N/R	4.633	0.398	2.287	46.3	JM-13 TRAP	2.912
814921	08-13-82	6849	N/R	0.007	0.458	3.146	56.1	JM-13 TRAP	5.890
814926	08-19-82	6999	N/R	0.000	0.539	1.549	58.5	JM-13 TRAP	5.396 -- Unsuccessful
815489	08-20-82	7016	.565	2.487	0.460	3.382	53.5	JM-13 TRAP	5.402
815496	08-26-82	7126	.383	0.690	0.486	1.894	53.7	JM-13 TRAP	5.427
815500	08-31-82	7198	.292	0.0	0.481	1.008	54.5	JM-13 TRAP	4.700
815507	09-09-82	7337	N/R	0.000	0.473	2.642	57.9	JM-13 TRAP	5.420
815508	09-10-82	7357	.522	0.000	0.440	0.823	55.5	JM-13 TRAP	4.070
none	09-27-82	7587	Not Measured					JM-13 TRAP	
none	10-05-82	7710	Not Measured					JM-13 TRAP	
816398	10-14-82	7811	1.972	4.515	0.459	1.318	51.2	JM-13 TRAP	5.058
816405	10-26-82	7938	N/R	6.679	0.467	0.600	49.0	JM-13 TRAP	5.514
816409	11-02-82	8020	N/R	4.991	0.450	0.707	50.6	JM-13 TRAP	5.395
816416	11-17-82	8129	N/R	0.845	0.398	2.589	62.0	JM-13 TRAP	4.988
817059	11-24-82	8250	N/R	N/R	N/R	N/R	N/R	JM-13 TRAP-- VOID	5.432
817064	12-01-82	8405	N/R	4.437	0.499	1.975	48.9	JM-13 TRAP	5.435
817069	12-15-82	8530	N/R	8.332	0.523	0.565	47.3	JM-13 TRAP	5.580
817425	12-28-82	8680	N/R	5.890	0.521	1.276	47.4	JM-13 TRAP	5.494
817430	01-04-83	8779	.864	0.057	0.520	3.930	52.8	JM-13 TRAP	5.407
817437	01-18-83	8980	N/R	5.011	0.562	1.999	48.3	JM-13 TRAP	4.208

Appendix C-1

Exhaust Backpressure Data on Mercedes 300D

VEHICLE I.D. 11511412019885 (1975 MERCEDES BENZ 300D)

	ODOM	--Exhaust Gas Backpressure (in of water)--					
Date	(mi)	20 mph	30 mph	40 mph	50 mph	60 mph	Trap
04-25-79	30637	N.M.*	N.M.*	10.93	15.59	24.33	Dummy Trap
04-26-79	30692	N.M.	N.M.	11.15	15.74	24.02	Dummy Trap
04-27-79	30725	N.M.	N.M.	6.61	10.01	14.94	Dummy Trap
04-30-79	30766	N.M.	N.M.	7.30	10.69	15.77	Dummy Trap
05-01-79	30800	N.M.	N.M.	7.09	10.56	15.08	Dummy Trap
05-10-79	30983	N.M.	N.M.	13.69	24.82	30.90	Texaco A-1R
05-10-79	31004	N.M.	N.M.	17.72	26.66	39.34	Texaco A-1R
05-11-79	31063	N.M.	N.M.	20.78	29.95	43.24	Texaco A-1R
N.R.*	31119	N.M.	N.M.	20.62	31.05	46.20	Texaco A-1R
05-15-79	31182	N.M.	N.M.	17.92	27.27	39.68	Texaco A-1R
05-15-79	31203	N.M.	N.M.	20.39	30.11	42.75	Texaco A-1R
05-16-79	31243	N.M.	N.M.	19.46	29.40	43.08	Texaco A-1R
05-16-79	31261	N.M.	N.M.	20.47	30.27	43.89	Texaco A-1R
05-16-79	31292	N.M.	N.M.	23.03	34.22	50.06	Texaco A-1R
05-16-79	31295	N.M.	N.M.	23.71	34.86	50.53	Texaco A-1R
05-16-79	31309	N.M.	N.M.	23.04	34.22	50.03	Texaco A-1R
05-17-79	31365	N.M.	N.M.	24.45	36.26	52.22	Texaco A-1R
05-17-79	31404	N.M.	N.M.	25.42	38.38	55.82	Texaco A-1R
05-18-79	31414	N.M.	N.M.	25.42	39.02	55.82	Texaco A-1R
05-22-79	31499	N.M.	N.M.	26.82	39.34	56.86	Texaco A-1R
05-22-79	31532	N.M.	N.M.	29.32	42.42	59.40	Texaco A-1R
05-22-79	31549	N.M.	N.M.	27.27	41.72	60.88	Texaco A-1R
05-23-79	31600	N.M.	N.M.	27.36	39.99	58.61	Texaco A-1R
05-23-79	31629	N.M.	N.M.	27.33	41.29	60.88	Texaco A-1R
06-04-79	31652	N.M.	N.M.	25.87	39.01	56.86	Texaco A-1R
06-04-79	31677	N.M.	N.M.	25.32	37.33	53.81	Texaco A-1R
06-05-79	31702	N.M.	N.M.	25.66	38.14	54.84	Texaco A-1R
06-06-79	31762	N.M.	N.M.	31.61	45.70	64.94	Texaco A-1R
N.R.	31842	Regeneration at Steady State					
06-10-79	31954	N.M.	N.M.	21.73	33.86	49.98	Texaco A-1R
06-10-79	31962	Regeneration at Steady State					
N.R.		Regeneration in Recirculating Oven @ 925°F for 6.5 hours					
N.R.	32150	N.M.	N.M.	14.69	22.78	34.89	Tex. A-1R after Oven Burnout
06-12-79	32076	N.M.	N.M.	10.35	16.41	25.49	Dummy Trap
06-13-79	32108	N.M.	N.M.	10.20	15.90	25.49	Dummy Trap
06-13-79	32128	N.M.	N.M.	10.20	15.90	25.17	Dummy Trap
07-02-79	32466	N.M.	N.M.	14.13	23.03	35.57	Texaco A-1R w CST-1
07-05-79	32589	N.M.	N.M.	13.35	20.13	29.42	Texaco A-1R w CST-1
07-06-79	32622	N.M.	N.M.	17.00	24.64	35.34	Texaco A-1R w CST-1
07-06-79	32653	N.M.	N.M.	13.53	20.16	29.17	Texaco A-1R w CST-1
07-07-79	32722	N.M.	N.M.	17.70	25.34	36.34	Texaco A-1R w CST-1
07-09-79	32749	N.M.	N.M.	12.84	19.40	28.38	Texaco A-1R w CST-1
07-09-79	32810	N.M.	N.M.	13.35	20.13	29.37	Texaco A-1R w CST-1
07-10-79	32844	N.M.	N.M.	17.70	24.64	35.65	Texaco A-1R w CST-1
07-10-79	32871	N.M.	N.M.	14.61	20.32	28.79	Texaco A-1R w CST-1
07-11-79	32890	N.M.	N.M.	13.03	19.40	29.17	Texaco A-1R w CST-1
07-11-79	32923	N.M.	N.M.	16.30	22.56	33.90	Texaco A-1R w CST-1
07-11-79	32933	N.M.	N.M.	12.14	18.39	27.68	Texaco A-1R w CST-1
07-11-79	32987	N.M.	N.M.	15.90	23.94	34.28	Texaco A-1R w CST-1
07-12-79	33000	N.M.	N.M.	12.84	19.09	28.10	Texaco A-1R w CST-1
07-12-79	33002	N.M.	N.M.	17.00	24.64	35.65	Texaco A-1R w CST-1
07-13-79	33058	N.M.	N.M.	14.96	23.55	34.28	Texaco A-1R w CST-1
07-18-79	33222	N.M.	N.M.	18.39	26.02	37.03	Texaco A-1R w CST-1
07-18-79	33237	N.M.	N.M.	18.17	26.02	37.25	Texaco A-1R w CST-1
07-18-79	33248	N.M.	N.M.	18.02	25.34	36.61	Texaco A-1R w CST-1
07-18-79	33258	N.M.	N.M.	17.00	24.72	35.97	Texaco A-1R w CST-1
07-18-79	33265	N.M.	N.M.	17.00	25.26	35.97	Texaco A-1R w CST-1
07-18-79	33276	N.M.	N.M.	17.11	24.64	36.29	Texaco A-1R w CST-1
07-18-79	33286	N.M.	N.M.	17.11	24.33	35.65	Texaco A-1R w CST-1
07-18-79	33295	N.M.	N.M.	17.00	25.34	36.29	Texaco A-1R w CST-1

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* 'N.R.' designates Not Recorded.

'N.M.' designates Not Measured.

Date	ODOM (mi)	--Exhaust Gas Backpressure (in of water)-- 20 mph	30 mph	40 mph	50 mph	60 mph	Trap
08-02-79	33620	N.M.	N.M.	14.91	20.49	28.79	ICI Saffil
08-02-79	33635	N.M.	N.M.	14.91	20.78	29.48	ICI Saffil
N.R.	33680	N.M.	N.M.	18.39	24.95	33.90	ICI Saffil
N.R.	34160	N.M.	N.M.	25.34	36.61	50.20	ICI Saffil
N.R.	34167	N.M.	N.M.	25.34	35.97	50.03	ICI Saffil
N.R.	34195	N.M.	N.M.	24.93	35.65	49.32	ICI Saffil
N.R.	34326	N.M.	N.M.	29.48	44.53	60.02	ICI Saffil
N.R.	343	Regeneration at Steady State					
N.R.	34360	N.M.	N.M.	16.30	22.16	30.85	ICI Saffil
N.R.	34508	N.M.	N.M.	25.34	35.65	47.94	ICI Saffil
N.R.	34736	N.M.	N.M.	30.17	43.16	56.93	ICI Saffil
N.R.	34	Regeneration at Steady State					
N.R.	34901	N.M.	N.M.	19.09	28.10	37.90	ICI Saffil
N.R.	34922	N.M.	N.M.	21.18	30.85	42.49	ICI Saffil
N.R.	34907	N.M.	N.M.	43.85	59.76	>73.2	Corning EX-40
N.R.	34914.5	N.M.	N.M.	54.44	73.14	>73.2	Corning EX-40
N.R.	34962	N.M.	N.M.	68.52	>73.2	>73.2	Corning EX-40
N.R.	34982	N.M.	54.15	>73.2	>73.2	>73.2	Corning EX-40
N.R.	34997	N.M.	N.M.	12.22	21.91	40.40	Balston Filter
N.R.	35015	N.M.	N.M.	50.81	71.49	>105.0	Balston Filter
N.R.	35036	N.M.	35.04	50.81	72.32	>105.0	Balston Filter
N.R.	35046	N.M.	34.30	55.43	74.00	>105.0	Balston Filter
N.R.	35086	N.M.	35.82	52.87	72.32	>105.0	Balston Filter
N.R.	35094	N.M.	8.17	12.94	20.13	30.87	Balston Filter
10-15-79	35227	Regeneration at Steady State Baseline					
10-16-79	35307	Regeneration at Steady State Baseline					
N.R.	35353	N.M.	N.M.	22.07	32.95	44.93	ICI Saffil
N.R.	35390	N.M.	N.M.	23.43	34.01	47.06	ICI Saffil
N.R.	35406	N.M.	N.M.	26.76	38.70	47.77	ICI Saffil
10-19-79	35413	N.M.	N.M.	26.77	38.38	53.84	ICI Saffil
10-19-79	35433	Regeneration at Steady State ICI Saffil					
N.R.	35447	N.M.	N.M.	N.M.	N.M.	46.78	ICI Saffil
10-22-79	35455	N.M.	N.M.	27.05	38.70	54.61	ICI Saffil
10-22-79	35481	N.M.	N.M.	26.10	38.02	53.93	ICI Saffil
10-23-79	35506	N.M.	N.M.	31.39	44.55	59.54	ICI Saffil
10-23-79	35524	N.M.	N.M.	32.03	45.62	62.89	ICI Saffil
10-23-79	35527	Regeneration at Steady State ICI Saffil (Attempted)					
10-23-79	35541	N.M.	N.M.	N.M.	N.M.	34.66	ICI Saffil
N.R.	35576	N.M.	N.M.	19.99	27.49	36.93	ICI Saffil
N.R.	35600	N.M.	N.M.	21.24	29.40	38.02	ICI Saffil
N.R.	35660	N.M.	N.M.	24.78	36.01	49.93	ICI Saffil
N.R.	35691	N.M.	N.M.	26.10	38.70	51.71	ICI Saffil
N.R.	35717	N.M.	N.M.	28.38	40.96	55.82	ICI Saffil
N.R.	35740	N.M.	N.M.	30.06	42.10	57.31	ICI Saffil
N.R.	35766	N.M.	N.M.	30.06	43.52	59.54	ICI Saffil
10-25-79	35792	N.M.	N.M.	32.03	45.87	62.89	ICI Saffil
10-25-79	35790	Regeneration at Steady State ICI Saffil					
N.R.	35809	N.M.	N.M.	N.M.	N.M.	42.82	ICI Saffil

Date	ODOM (mi)	--Exhaust Gas Backpressure (in of water)-- 20 mph	30 mph	40 mph	50 mph	60 mph	Trap
11-07-79	35976	N.M.	N.M.	17.88	26.10	38.02	Texaco A-1R w CST-1 #2
11-07-79	36000	N.M.	N.M.	18.25	26.77	38.02	Texaco A-1R w CST-1 #2
11-07-79	36021	N.M.	N.M.	18.60	27.43	39.39	Texaco A-1R w CST-1 #2
11-07-79	36047	N.M.	N.M.	20.01	28.41	41.45	Texaco A-1R w CST-1 #2
11-08-79	36068	N.M.	N.M.	19.30	27.43	38.88	Texaco A-1R w CST-1 #2
11-08-79	36092	N.M.	N.M.	20.70	27.43	39.39	Texaco A-1R w CST-1 #2
11-08-79	36116	N.M.	N.M.	20.01	28.74	40.75	Texaco A-1R w CST-1 #2
11-09-79	36139	N.M.	N.M.	19.66	29.07	40.75	Texaco A-1R w CST-1 #2
11-09-79	36162	N.M.	N.M.	18.60	27.43	39.39	Texaco A-1R w CST-1 #2
11-09-79	36185	N.M.	N.M.	18.60	27.76	39.39	Texaco A-1R w CST-1 #2
11-13-79	36200	N.M.	N.M.	20.70	31.37	44.22	Texaco A-1R w CST-1 #2
11-13-79	36225	N.M.	N.M.	19.30	28.08	41.45	Texaco A-1R w CST-1 #2
11-14-79	36248	N.M.	N.M.	20.01	29.07	42.13	Texaco A-1R w CST-1 #2
11-14-79	36272	N.M.	N.M.	20.70	30.06	43.52	Texaco A-1R w CST-1 #2
11-14-79	36293	N.M.	N.M.	20.70	29.40	41.45	Texaco A-1R w CST-1 #2
11-14-79	36316	N.M.	N.M.	18.95	27.43	40.07	Texaco A-1R w CST-1 #2
11-15-79	36339	N.M.	N.M.	17.88	27.10	40.41	Texaco A-1R w CST-1 #2
11-15-79	36355	N.M.	N.M.	19.30	28.74	41.09	Texaco A-1R w CST-1 #2
11-15-79	36380	N.M.	N.M.	20.01	30.06	42.83	Texaco A-1R w CST-1 #2
11-16-79	36396	N.M.	N.M.	20.01	30.06	42.83	Texaco A-1R w CST-1 #2
11-16-79	36408	N.M.	N.M.	20.70	30.39	42.13	Texaco A-1R w CST-1 #2
11-16-79	36421	N.M.	N.M.	20.01	28.74	40.75	Texaco A-1R w CST-1 #2
11-16-79	36444	N.M.	N.M.	19.30	28.74	41.45	Texaco A-1R w CST-1 #2
11-16-79	36468	N.M.	N.M.	20.01	29.40	42.13	Texaco A-1R w CST-1 #2
11-16-79	36492	N.M.	N.M.	20.13	30.39	43.52	Texaco A-1R w CST-1 #2
11-16-79	36504	N.M.	N.M.	20.70	29.73	42.49	Texaco A-1R w CST-1 #2
11-16-79	36516	N.M.	N.M.	20.36	29.40	41.45	Texaco A-1R w CST-1 #2
11-18-79	36540	N.M.	N.M.	19.30	29.40	41.45	Texaco A-1R w CST-1 #2
11-18-79	36563	N.M.	N.M.	20.36	30.72	44.22	Texaco A-1R w CST-1 #2
11-18-79	36575	N.M.	N.M.	20.70	29.40	42.13	Texaco A-1R w CST-1 #2
11-18-79	36587	N.M.	N.M.	20.70	29.73	41.09	Texaco A-1R w CST-1 #2
11-19-79	36609	N.M.	N.M.	19.30	28.41	40.75	Texaco A-1R w CST-1 #2
11-20-79	36625	N.M.	N.M.	19.66	28.74	40.07	Texaco A-1R w CST-1 #2
11-20-79	36648	N.M.	N.M.	19.30	29.40	42.13	Texaco A-1R w CST-1 #2
11-21-79	36672	N.M.	N.M.	19.30	29.40	41.45	Texaco A-1R w CST-1 #2
11-21-79	36695	N.M.	N.M.	20.01	30.06	42.49	Texaco A-1R w CST-1 #2
11-23-79	36718	N.M.	N.M.	20.01	30.06	42.83	Texaco A-1R w CST-1 #2
11-23-79	36741	N.M.	N.M.	20.70	30.72	44.58	Texaco A-1R w CST-1 #2
11-23-79	36752	N.M.	N.M.	22.07	31.37	43.18	Texaco A-1R w CST-1 #2
11-23-79	36763	N.M.	N.M.	20.70	30.06	41.11	Texaco A-1R w CST-1 #2
11-26-79	36782	N.M.	N.M.	22.76	33.36	50.31	Texaco A-1R w CST-1 #2
11-26-79	36795	N.M.	N.M.	21.73	30.06	42.82	Texaco A-1R w CST-1 #2
11-26-79	36807	N.M.	N.M.	21.39	28.08	42.13	Texaco A-1R w CST-1 #2
11-27-79	36852	N.M.	N.M.	22.41	32.70	47.77	Texaco A-1R w CST-1 #2
11-27-79	36875	N.M.	N.M.	20.01	31.38	47.77	Texaco A-1R w CST-1 #2
11-27-79	36899	N.M.	N.M.	17.88	29.41	43.52	Texaco A-1R w CST-1 #2
11-29-79	36923	N.M.	N.M.	16.44	26.11	38.37	Texaco A-1R w CST-1 #2
12-04-79	36949	N.M.	N.M.	16.44	25.11	36.35	Texaco A-1R w CST-1 #2
12-05-79	36954	N.M.	N.M.	16.65	26.86	39.25	Texaco A-1R w CST-1 #2
12-06-79	36976	N.M.	N.M.	20.70	32.77	44.93	Texaco A-1R w CST-1 #2
12-06-79	37002	N.M.	N.M.	21.39	31.71	45.63	Texaco A-1R w CST-1 #2
12-06-79	37023	N.M.	N.M.	21.39	31.71	45.63	Texaco A-1R w CST-1 #2
12-07-79	37046	N.M.	N.M.	22.76	34.02	49.22	Texaco A-1R w CST-1 #2
12-07-79	37070	N.M.	N.M.	22.76	34.02	48.49	Texaco A-1R w CST-1 #2
12-07-79	37094	N.M.	N.M.	24.11	36.02	51.40	Texaco A-1R w CST-1 #2
12-08-79	37119	N.M.	N.M.	24.78	36.69	51.40	Texaco A-1R w CST-1 #2
12-08-79	37129	N.M.	N.M.	26.11	36.02	50.31	Texaco A-1R w CST-1 #2
12-09-79	37141	N.M.	N.M.	22.76	32.70	47.06	Texaco A-1R w CST-1 #2
12-09-79	37165	N.M.	N.M.	23.43	34.02	49.22	Texaco A-1R w CST-1 #2
12-09-79	37196	N.M.	N.M.	24.11	34.68	50.67	Texaco A-1R w CST-1 #2
12-11-79	37291	N.M.	N.M.	22.76	33.36	47.06	Texaco A-1R w CST-1 #2
12-12-79	37317	N.M.	N.M.	21.39	31.38	46.34	Texaco A-1R w CST-1 #2
12-12-79	37341	N.M.	N.M.	20.01	32.04	46.34	Texaco A-1R w CST-1 #2
12-12-79	37362	N.M.	N.M.	22.08	33.36	49.22	Texaco A-1R w CST-1 #2
12-12-79	37378	N.M.	N.M.	22.76	34.68	49.94	Texaco A-1R w CST-1 #2
12-14-79	37402	N.M.	N.M.	23.53	36.70	54.17	Texaco A-1R w CST-1 #2
12-26-79	37463	N.M.	N.M.	23.52	37.72	55.22	Texaco A-1R w CST-1 #2
12-27-79	37486	N.M.	N.M.	24.53	37.72	55.22	Texaco A-1R w CST-1 #2
01-02-80	37519	N.M.	N.M.	25.54	38.74	57.30	Texaco A-1R w CST-1 #2
01-02-80	37541	N.M.	N.M.	25.55	39.76	58.38	Texaco A-1R w CST-1 #2
01-02-80	37565	N.M.	N.M.	25.55	39.76	58.35	Texaco A-1R w CST-1 #2
01-03-80	37589	N.M.	N.M.	25.54	39.76	58.35	Texaco A-1R w CST-1 #2
01-03-80	37613	N.M.	N.M.	26.05	40.78	60.45	Texaco A-1R w CST-1 #2

Date	ODOM (mi)	--Exhaust Gas Backpressure (in of water)--					Trap
		20 mph	30 mph	40 mph	50 mph	60 mph	
01-04-80	36737	N.M.	N.M.	24.53	38.74	58.35	Texaco A-1R w CST-1 #2
01-04-80	37661	N.M.	N.M.	27.06	41.80	62.55	Texaco A-1R w CST-1 #2
01-04-80	37685	N.M.	N.M.	25.55	39.76	59.40	Texaco A-1R w CST-1 #2
01-05-80	37709	N.M.	N.M.	23.52	37.72	57.30	Texaco A-1R w CST-1 #2
01-05-80	37733	N.M.	N.M.	25.55	39.76	58.35	Texaco A-1R w CST-1 #2
01-05-80	37756	N.M.	N.M.	24.53	39.76	58.35	Texaco A-1R w CST-1 #2
01-06-80	37782	N.M.	N.M.	21.50	35.68	54.17	Texaco A-1R w CST-1 #2
01-06-80	37807	N.M.	N.M.	23.52	37.72	55.22	Texaco A-1R w CST-1 #2
01-07-80	37833	N.M.	N.M.	N.M.	37.72	55.22	Texaco A-1R w CST-1 #2
01-08-80	37868	N.M.	N.M.	23.52	37.72	55.22	Texaco A-1R w CST-1 #2
01-08-80	36893	N.M.	N.M.	24.53	38.23	56.26	Texaco A-1R w CST-1 #2
01-08-80	37917	N.M.	N.M.	24.53	38.74	56.26	Texaco A-1R w CST-1 #2
01-08-80	37941	N.M.	N.M.	24.53	38.74	57.30	Texaco A-1R w CST-1 #2
01-29-80	38217	N.M.	62.55	93.88	>105.0	>105.0	Corning EX-47 6" Non-Cat.
01-29-80	38240	68.9	74.26	>105.0	N.M.	N.M.	Corning EX-47 6" Non-Cat.
01-29-80	38248	75.3	84.0	N.M.	N.M.	N.M.	Corning EX-47 6" Non-Cat.
01-29-80	38263	86.2	93.8	N.M.	N.M.	N.M.	Corning EX-47 6" Non-Cat.
01-30-80	38275	88.3	98.3	N.M.	N.M.	N.M.	Corning EX-47 6" Non-Cat.
01-30-80	38285	N.M.	N.M.	39.20	53.2	72.11	Corning EX-47 6" w CST-1
01-31-80	38321	51.06	53.7	78.57	N.M.	N.M.	Corning EX-47 6" w CST-1
01-31-80	38330	55.21	55.21	60.45	91.67	N.M.	Corning EX-47 6" w CST-1
01-31-80	38340	65.72	71.04	106.0	N.M.	N.M.	Corning EX-47 6" w CST-1
01-31-80	38348	72.11	78.58	N.M.	N.M.	N.M.	Corning EX-47 6" w CST-1
02-01-80	38360	84.0	N.M.	N.M.	N.M.	N.M.	Corning EX-47 6" w CST-1
02-01-80	38387	96.09	N.M.	N.M.	N.M.	N.M.	Corning EX-47 6" w CST-1
02-01-80	38395	102.74	N.M.	N.M.	N.M.	N.M.	Corning EX-47 6" w CST-1
02-01-80	38	Regeneration at Steady State (Unsuccessful)					
02-12-80	38440	N.M.	N.M.	N.M.	25.56	36.7	Corning EX-47 12" Non-Cat #1
02-12-80	38461	N.M.	N.M.	N.M.	32.4	43.1	Corning EX-47 12" Non-Cat #1
02-12-80	38472	N.M.	N.M.	N.M.	35.7	47.3	Corning EX-47 12" Non-Cat #1
02-12-80	38479	N.M.	N.M.	N.M.	38.7	52.5	Corning EX-47 12" Non-Cat #1
02-13-80	38491	N.M.	N.M.	N.M.	41.70	55.21	Corning EX-47 12" Non-Cat #1
02-14-80	38502	N.M.	N.M.	44.87	57.7	62.53	Corning EX-47 12" Non-Cat #1
02-14-80	38532	N.M.	N.M.	39.75	54.19	74.22	Corning EX-47 12" Non-Cat #1
02-14-80	38541	N.M.	N.M.	42.82	58.8	78.0	Corning EX-47 12" Non-Cat #1
02-15-80	38557	N.M.	N.M.	47.96	64.66	85.11	Corning EX-47 12" Non-Cat #1
02-15-80	38585	N.M.	N.M.	56.25	74.26	97.15	Corning EX-47 12" Non-Cat #1
02-15-80	38594	N.M.	N.M.	57.8	78.58	104.2	Corning EX-47 12" Non-Cat #1
02-15-80	38605	N.M.	40.1	60.45	82.91	N.M.	Corning EX-47 12" Non-Cat #1
02-22-80	38656	47.96	49.9	74.26	101.1	N.M.	Corning EX-47 12" Non-Cat #1
02-22-80	38666	N.M.	55.21	80.74	N.M.	N.M.	Corning EX-47 12" Non-Cat #1
02-22-80	38674	N.M.	58.35	84.5	N.M.	N.M.	Corning EX-47 12" Non-Cat #1
N.R.	38	Regeneration at Steady State					
02-26-80	38725	14.40	15.42	23.0	30.1	41.2	Corning EX-47 12" Non-Cat #1
02-26-80	38735	N.M.	N.M.	25.45	35.8	49.5	Corning EX-47 12" Non-Cat #1
02-27-80	38746	N.M.	N.M.	39.75	35.21	73.8	Corning EX-47 12" Non-Cat #1
02-27-80	38767	N.M.	N.M.	51.06	67.84	89.9	Corning EX-47 12" Non-Cat #1
02-27-80	38776	N.M.	N.M.	56.25	77.5	102.9	Corning EX-47 12" Non-Cat #1
02-27-80	38785	N.M.	42.82	63.6	87.28	N.M.	Corning EX-47 12" Non-Cat #1
02-28-80	38807	N.M.	48.50	72.11	98.30	N.M.	Corning EX-47 12" Non-Cat #1
02-28-80	38821	N.M.	53.5	78.1	N.M.	N.M.	Corning EX-47 12" Non-Cat #1
02-28-80	38829.5	N.M.	59.5	88.38	N.M.	N.M.	Corning EX-47 12" Non-Cat #1
02-28-80	38837	N.M.	62.5	96.09	N.M.	N.M.	Corning EX-47 12" Non-Cat #1
02-29-80	38849	N.M.	69.98	105.1	N.M.	N.M.	Corning EX-47 12" Non-Cat #1
02-29-80	38869	N.M.	66.78	99.41	N.M.	N.M.	Corning EX-47 12" Non-Cat #1
02-29-80	38876	N.M.	76.41	N.M.	N.M.	N.M.	Corning EX-47 12" Non-Cat #1
02-29-80	38884	N.M.	78.57	N.M.	N.M.	N.M.	Corning EX-47 12" Non-Cat #1
02-29-80	38	Regeneration at Steady State					
02-29-80	38907	13.38	15.42	22.51	30.5	39.76	Corning EX-47 12" Non-Cat #1
03-24-80	39196	N.M.	114.76	165.65	210.6	246.29	Corning EX-47 12" Non-Cat #1
03-26-80	39216	N.M.	126.46	183.40	228.5	264.05	Corning EX-47 12" Non-Cat #1
03-26-80	39228	N.M.	139.74	199.17	246.29	278.93	Corning EX-47 12" Non-Cat #1
03-26-80	39237	N.M.	149.63	210.6	261.08	303.17	Corning EX-47 12" Non-Cat #1
03-26-80	39246	N.M.	160.42	222.56	276.24	N.M.	Corning EX-47 12" Non-Cat #1
N.R.	39267	N.M.	143.45	210.60	258.12	N.M.	Corning EX-47 12" Non-Cat #1

Date	ODOM (mi)	--Exhaust Gas Backpressure (in of water)-- 20 mph	30 mph	40 mph	50 mph	60 mph	Trap
04-01-80	39276	N.M.	162.58	229.99	283.72	N.M.	Corning EX-47 12" Non-Cat #1
04-01-80	39285	N.M.	163.50	227.02	281.92	N.M.	Corning EX-47 12" Non-Cat #1
04-01-80	39214	N.M.	180.35	250.13	N.M.	N.M.	Corning EX-47 12" Non-Cat #1
04-01-80	39302	N.M.	189.48	267.57	N.M.	N.M.	Corning EX-47 12" Non-Cat #1
04-01-80	39310	N.M.	203.09	276.84	N.M.	N.M.	Corning EX-47 12" Non-Cat #1
04-02-80	39322	N.M.	152.10	221.96	284.62	N.M.	Corning EX-47 12" Non-Cat #1
04-02-80	39329	N.M.	197.66	272.96	N.M.	N.M.	Corning EX-47 12" Non-Cat #1
N.R.	39340	N.M.	180.35	261.08	N.M.	N.M.	Corning EX-47 12" Non-Cat #1
04-03-80	39347	N.M.	192.52	269.98	N.M.	N.M.	Corning EX-47 12" Non-Cat #1
04-03-80	39355	N.M.	218.08	300.09	N.M.	N.M.	Corning EX-47 12" Non-Cat #1
04-03-80	39363	N.M.	204.6	284.92	N.M.	N.M.	Corning EX-47 12" Non-Cat #1
04-08-80	39363	Regeneration at Steady State					
04-08-80	39417	N.M.	21.96	25.73	31.06	38.37	Corning EX-47 12" Non-Cat #1
04-08-80	39418	N.M.	21.96	24.65	31.06	38.87	Corning EX-47 12" Non-Cat #1
04-10-80	39446	N.M.	26.87	32.25	39.87	50.53	Corning EX-47 12" Non-Cat #1
04-10-80	39455	N.M.	27.79	35.40	42.93	53.76	Corning EX-47 12" Non-Cat #1
04-11-80	39478	N.M.	29.88	37.87	47.62	60.63	Corning EX-47 12" Non-Cat #1
04-11-80	39488	N.M.	31.06	40.89	52.95	68.81	Corning EX-47 12" Non-Cat #1
04-11-80	39498	N.M.	32.97	42.93	56.22	73.70	Corning EX-47 12" Non-Cat #1
04-11-80	39508	N.M.	33.93	46.04	60.08	78.35	Corning EX-47 12" Non-Cat #1
04-11-80	39517	N.M.	36.63	50.53	63.99	81.87	Corning EX-47 12" Non-Cat #1
04-15-80	39549	N.M.	37.62	51.87	67.95	82.46	Corning EX-47 12" Non-Cat #1
04-15-80	39557	N.M.	40.89	57.31	75.15	91.56	Corning EX-47 12" Non-Cat #1
04-15-80	39567	N.M.	42.93	60.08	79.52	100.42	Corning EX-47 12" Non-Cat #1
04-16-80	39588	N.M.	43.45	60.08	77.47	101.03	Corning EX-47 12" Non-Cat #1
04-16-80	39600	N.M.	48.80	69.38	93.18	114.15	Corning EX-47 12" Non-Cat #1
04-16-80	39608	N.M.	51.07	72.54	93.18	116.30	Corning EX-47 12" Non-Cat #1
04-16-80	39618	N.M.	53.49	75.44	98.30	124.3	Corning EX-47 12" Non-Cat #1
04-22-80	39654	N.M.	60.91	88.39	115.99	140.98	Corning EX-47 12" Non-Cat #1
04-22-80	39663	N.M.	63.71	90.78	114.15	142.21	Corning EX-47 12" Non-Cat #1
04-22-80	39672	N.M.	65.68	95.29	120.91	149.01	Corning EX-47 12" Non-Cat #1
04-16-81	41544	N.M.	15.5	15.4	20.9	28.7	Corning EX-47 12" w UOP
04-17-81	41584	N.M.	19.7	19.3	26.8	37.3	Corning EX-47 12" w UOP
04-28-81	41728	N.M.	7.6	8.3	10.4	14.9	Dummy Trap
04-29-81	41776	N.M.	8.0	8.8	11.3	15.8	Dummy Trap
07-29-81	41872	N.M.	8.0	8.8	11.3	15.6	Dummy Trap
N.R.	42012	N.M.	16.97	17.6	25.5	35.3	Corning EX-47 12" w UOP
08-31-81	42026	N.M.	12.92	19.3	25.8	34.3	Corning EX-47 12" w UOP
09-01-81	42053	N.M.	N.M.	21.00	28.93	40.57	Corning EX-47 12" w UOP
09-01-81	42075	N.M.	24.386	22.444	30.73	41.90	Corning EX-47 12" w UOP
09-01-81	42094	N.M.	23.218	22.831	31.84	43.85	Corning EX-47 12" w UOP
09-03-81	42116	N.M.	29.13	28.03	39.86	53.6	Corning EX-47 12" w UOP
09-03-81	42140	N.M.	31.43	30.29	41.90	55.9	Corning EX-47 12" w UOP
09-03-81	42151	N.M.	N.M.	30.43	42.93	58.6	Corning EX-47 12" w UOP
09-09-81	42174	N.M.	23.3	32.7	45.7	63.8	Corning EX-47 12" w UOP
09-09-81	42199	N.M.	25.1	34.8	47.5	65.6	Corning EX-47 12" w UOP
09-15-81	42222	N.M.	25.1	36.1	48.5	66.8	Corning EX-47 12" w UOP
09-15-81	42232	N.M.	25.8	36.8	50.8	69.8	Corning EX-47 12" w UOP
09-17-81	42272	N.M.	27.5	39.35	54.2	72.3	Corning EX-47 12" w UOP
09-17-81	42301	N.M.	N.M.	42.31	57.8	77.3	Corning EX-47 12" w UOP
09-24-81	42342	N.M.	34.5	49.4	68.4	91.0	Corning EX-47 12" w UOP
09-24-81	42365	N.M.	34.7	49.6	68.1	92.0	Corning EX-47 12" w UOP
09-24-81	42376	N.M.	33.3	50.3	69.8	95.1	Corning EX-47 12" w UOP
09-30-81	42396	N.M.	36.2	54.6	76.3	102.8	Corning EX-47 12" w UOP
10-01-81	42419	N.M.	46.3	64.9	87.9	116.7	Corning EX-47 12" w UOP
10-01-81	42426	N.M.	45.2	67.4	91.9	121.4	Corning EX-47 12" w UOP
10-09-81	42458	Regeneration at Steady State					
10-09-81	42403	N.M.	N.M.	N.M.	N.M.	45.9	Corning EX-47 12" w UOP
10-09-81	42474	N.M.	22.1	33.4	48.3	68.9	Corning EX-47 12" w UOP
10-15-81	42481	N.M.	20.0	29.0	42.0	58.0	Corning EX-47 12" w UOP
10-15-81	42505	N.M.	22.0	31.0	45.0	61.0	Corning EX-47 12" w UOP
10-20-81	42545	N.M.	39.2	57.92	80.73	102.00	Corning EX-47 12" w UOP
10-20-81	42570	N.M.	51.66	74.95	98.7	125.0	Corning EX-47 12" w UOP
10-20-81	42579	N.M.	51.66	74.95	104.5	131.5	Corning EX-47 12" w UOP
10-21-81	42619	Regeneration at Steady State					
10-22-81	42643	N.M.	16.69	21.4	28.72	39.65	Corning EX-47 12" w UOP
10-22-81	42666	N.M.	15.78	20.9	29.13	40.37	Corning EX-47 12" w UOP
10-22-81	42679	N.M.	16.14	21.96	31.53	44.67	Corning EX-47 12" w UOP
10-27-81	42718	N.M.	20.9	29.3	39.75	52.4	Corning EX-47 12" w UOP
10-27-81	42736	N.M.	20.5	29.7	41.7	56.7	Corning EX-47 12" w UOP

	ODOM	--Exhaust Gas Backpressure (in of water)--					
Date	(mi)	20 mph	30 mph	40 mph	50 mph	60 mph	Trap
10-28-81	42759	N.M.	20.5	29.1	40.6	54.7	Corning EX-47 12" w UOP
10-28-81	42769	N.M.	21.4	30.6	43.4	59.2	Corning EX-47 12" w UOP
10-28-81	42786	N.M.	22.4	31.2	42.9	60.2	Corning EX-47 12" w UOP
10-28-81	42802	N.M.	17.5	24.1	34.3	47.9	Corning EX-47 12" w UOP
10-29-81	42816	N.M.	11.7	14.4	20.8	30.22	Corning EX-47 12" w UOP
11-10-81	42888	N.M.	6.47	7.05	10.9	16.95	Dummy Trap
11-12-81	42930	N.M.	6.3	6.5	9.9	15.3	Dummy Trap
11-17-81	42978	N.M.	6.0	6.0	9.0	14.0	Dummy Trap
11-24-81	42979	N.M.	15.09	19.79	27.58	38.10	NGK #2
11-25-81	43004	N.M.	17.5	24.1	34.2	48.5	NGK #2
11-25-81	43027	N.M.	22.0	29.7	40.7	56.0	NGK #2
11-25-81	43037	N.M.	21.9	30.5	42.8	59.5	NGK #2
12-01-81	43059	N.M.	26.4	36.5	49.8	67.9	NGK #2
12-01-81	43082	N.M.	29.2	40.8	55.0	73.9	NGK #2
12-01-81	43091	N.M.	29.5	41.4	56.6	76.1	NGK #2
12-08-81	43182	N.M.	53.08	76.19	103.28	133.53	NGK #2
12-08-81	43192	N.M.	51.89	72.53	94.48	96.08	NGK #2
12-08-81	43202	N.M.	53.08	74.25	96.08	124.08	NGK #2
12-09-81	43215	N.M.	55.6	74.25	104.3	131.3	NGK #2
12-09-81	43237	N.M.	61.9	86.2	112.5	140.4	NGK #2
12-09-81	43247	N.M.	61.6	87.8	115.2	143.5	NGK #2
12-09-81	43264	Regeneration at Steady State					
12-09-81	43274	N.M.	31.9	46.0	61.0	78.2	NGK #2
12-10-81	43294	N.M.	40.0	56.6	75.2	97.8	NGK #2
12-10-81	43315	N.M.	46.6	66.6	87.8	113.2	NGK #2
12-10-81	43325	N.M.	48.8	68.8	92.1	119.1	NGK #2
12-11-81	43338	N.M.	54.15	76.04	100.2	127.2	NGK #2
12-11-81	43360	N.M.	59.9	84.7	109.0	136.4	NGK #2
12-11-81	43369	N.M.	61.3	86.1	112.4	139.3	NGK #2
12-16-81	43374	Regeneration at Steady State					
12-16-81	43387	N.M.	25.0	36.6	48.4	62.0	NGK #2
12-16-81	43397	N.M.	27.68	38.09	52.38	70.38	NGK #2
12-17-81	43478	N.M.	33.6	46.5	62.09	81.10	NGK #2
12-17-81	43429	N.M.	41.88	58.09	76.30	97.08	NGK #2
12-17-81	43438	N.M.	42.15	58.79	77.75	100.15	NGK #2
12-17-81	43466	N.M.	51.8	71.80	94.30	119.40	NGK #2
12-17-81	43477	N.M.	57.20	76.01	98.70	123.98	NGK #2
12-17-81	43487	N.M.	55.08	79.08	103.53	132.08	NGK #2
12-22-81	43507	N.M.	62.3	89.1	117.5	148.4	NGK #2
12-22-81	43529	N.M.	66.9	95.1	123.6	156.9	NGK #2
12-22-81	43538	N.M.	67.2	96.3	124.8	159.2	NGK #2
12-23-81	43547	Regeneration at Steady State (Unsuccessful)					
01-05-82	43569	N.M.	43.8	66.3	92.8	124.98	NGK #2
01-05-82	43580	N.M.	58.0	83.5	112.7	144.7	NGK #2
01-05-82	43589	N.M.	62.9	95.6	124.7	161.60	NGK #2
01-06-82	43590	Regeneration at Steady State					
01-06-81	43610	N.M.	22.3	32.1	43.2	56.3	NGK #2
01-19-81	43657	N.M.	36.01	49.8	66.54	87.98	NGK #2
01-19-81	43673	N.M.	42.98	57.28	73.60	94.48	NGK #2
01-19-81	43684	N.M.	45.48	62.38	80.45	103.08	NGK #2
01-19-81	43696	N.M.	47.1	66.6	85.1	109.0	NGK #2
01-19-81	43708	N.M.	49.5	68.8	89.5	114.7	NGK #2
01-19-81	43718	N.M.	49.7	70.0	91.1	119.2	NGK #2
01-19-81	43732	N.M.	56.8	79.8	100.0	125.5	NGK #2
01-19-81	43743	N.M.	60.6	83.4	105.4	133.4	NGK #2
01-19-81	43754	N.M.	61.4	85.4	108.7	137.6	NGK #2
01-19-81	43768	N.M.	63.4	88.98	112.9	141.6	NGK #2
01-19-81	43779	N.M.	67.0	93.5	118.4	148.9	NGK #2
01-19-82	43791	N.M.	N.M.	N.M.	122.98	154.43	NGK #2
01-19-82	43803	N.M.	67.9	95.3	122.1	153.4	NGK #2
01-19-82	43817	N.M.	71.9	101.3	127.8	160.6	NGK #2
01-20-82	43819	Regeneration at Steady State					
01-20-82	43846	N.M.	35.2	50.0	68.2	91.2	NGK #2
01-20-82	43858	N.M.	41.2	59.3	79.3	102.8	NGK #2
01-20-82	43869	N.M.	38.0	53.0	69.8	90.9	NGK #2
01-21-82	43879	N.M.	39.0	53.3	71.3	94.0	NGK #2
01-21-82	43893	N.M.	44.9	62.2	79.05	102.6	NGK #2
01-21-82	43905	N.M.	47.9	66.4	85.3	108.5	NGK #2

	ODOM	--Exhaust Gas Backpressure (in of water)--					
Date	(mi)	20 mph	30 mph	40 mph	50 mph	60 mph	Trap
N.R.	43921	N.M.	51.6	74.0	97.7	123.8	NGK #2
N.R.	43932	N.M.	51.9	72.0	92.3	117.0	NGK #2
N.R.	43944	N.M.	53.8	75.4	97.8	123.9	NGK #2
N.R.	43955	N.M.	58.0	81.2	103.3	129.1	NGK #2
02-18-82	43964	N.M.	56.3	78.9	101.7	131.5	NGK #2
02-18-82	43973	N.M.	58.7	82.8	109.5	140.3	NGK #2
02-18-82	43982	N.M.	61.3	86.9	114.8	146.7	NGK #2
02-18-82	43991	N.M.	63.4	91.6	119.0	148.9	NGK #2
03-31-82	44439	N.M.	11.30	12.98	18.08	26.08	Corning EX-47 12" Non-Cat #2
04-01-82	44451	N.M.	14.08	17.25	24.68	34.60	Corning EX-47 12" Non-Cat #2
04-01-82	44472	N.M.	16.85	22.38	29.69	41.08	Corning EX-47 12" Non-Cat #2
04-01-82	44481	N.M.	17.48	21.50	30.01	42.08	Corning EX-47 12" Non-Cat #2
04-02-82	44493	N.M.	19.38	25.2	34.7	47.9	Corning EX-47 12" Non-Cat #2
04-05-82	44502	N.M.	17.9	24.98	34.1	46.6	Corning EX-47 12" Non-Cat #2
04-06-82	44524	N.M.	22.1	30.7	42.2	57.0	Corning EX-47 12" Non-Cat #2
04-06-82	44533	N.M.	23.20	30.98	42.6	58.5	Corning EX-47 12" Non-Cat #2
04-07-82	44543	N.M.	22.4	31.2	42.8	58.2	Corning EX-47 12" Non-Cat #2
04-07-82	44552	N.M.	24.7	34.2	46.8	62.7	Corning EX-47 12" Non-Cat #2
04-08-82	44561	N.M.	25.0	35.6	49.6	66.7	Corning EX-47 12" Non-Cat #2
04-08-82	44570	N.M.	28.4	39.2	52.98	70.40	Corning EX-47 12" Non-Cat #2
04-09-82	44591	N.M.	N.M.	46.9	62.08	82.1	Corning EX-47 12" Non-Cat #2
04-09-82	44601	N.M.	34.1	47.3	63.8	84.98	Corning EX-47 12" Non-Cat #2
04-09-82	44610	N.M.	36.5	51.0	67.4	89.3	Corning EX-47 12" Non-Cat #2
04-09-82	44631	N.M.	42.9	60.2	79.2	101.5	Corning EX-47 12" Non-Cat #2
04-12-82	44640	N.M.	40.1	57.6	76.7	100.8	Corning EX-47 12" Non-Cat #2
04-13-82	44652	N.M.	48.1	67.1	88.2	113.9	Corning EX-47 12" Non-Cat #2
04-14-82	44665	N.M.	48.1	70.8	95.1	122.3	Corning EX-47 12" Non-Cat #2
04-14-82	44665	Regeneration at Steady State					
04-14-82	44692	N.M.	32.7	46.1	61.4	80.2	Corning EX-47 12" Non-Cat #2
04-16-82	44704	N.M.	37.8	53.45	70.98	93.25	Corning EX-47 12" Non-Cat #2
04-16-82	44725	N.M.	44.28	61.7	81.4	105.5	Corning EX-47 12" Non-Cat #2
04-16-82	44734	N.M.	45.1	64.98	83.5	109.1	Corning EX-47 12" Non-Cat #2
04-19-82	44743	N.M.	48.0	67.9	89.2	115.3	Corning EX-47 12" Non-Cat #2
04-23-82	44763	N.M.	58.98	83.5	109.98	142.0	Corning EX-47 12" Non-Cat #2
04-23-82	44784	N.M.	66.6	94.4	123.7	155.5	Corning EX-47 12" Non-Cat #2
04-26-82	44792	N.M.	66.1	95.1	125.0	157.0	Corning EX-47 12" Non-Cat #2
04-27-82	44805	N.M.	78.05	108.6	145.5	181.4	Corning EX-47 12" Non-Cat #2
04-29-82	44805	Regeneration at Steady State					
04-29-82	44838	N.M.	31.6	45.2	62.5	86.6	Corning EX-47 12" Non-Cat #2
05-03-82	44847	N.M.	36.3	51.9	70.6	93.8	Corning EX-47 12" Non-Cat #2
05-05-82	44859	N.M.	45.3	63.4	87.5	109.2	Corning EX-47 12" Non-Cat #2
05-17-82	44868	N.M.	45.6	65.8	88.4	115.7	Corning EX-47 12" Non-Cat #2
05-18-82	44899	N.M.	58.7	81.3	114.6	142.4	Corning EX-47 12" Non-Cat #2
05-18-82	44910	N.M.	64.7	93.5	116.2	150.4	Corning EX-47 12" Non-Cat #2
05-18-82	44918	N.M.	101.5	133.2	168.6	154.8	Corning EX-47 12" Non-Cat #2
05-19-82	44930	N.M.	77.4	106.4	143.6	170.2	Corning EX-47 12" Non-Cat #2
05-19-82	44938	N.M.	123.3	116.9	155.0	179.1	Corning EX-47 12" Non-Cat #2
05-24-82	44947	N.M.	8.23	10.40	14.20	20.78	NGK #3
05-26-82	44960	N.M.	16.1	14.4	20.8	27.60	NGK #3
05-27-82	44971	N.M.	12.8	14.6	20.0	29.7	NGK #3
05-27-82	44991	N.M.	18.1	18.5	24.2	34.5	NGK #3
05-27-81	45013	N.M.	14.4	20.2	27.8	38.6	NGK #3
05-27-81	45021	N.M.	17.1	17.7	25.4	37.4	NGK #3
05-27-82	45029	N.M.	14.0	18.4	26.7	38.6	NGK #3
05-28-82	45064	N.M.	24.5	24.1	33.7	45.5	NGK #3
05-28-82	45072	N.M.	23.2	22.5	32.4	45.7	NGK #3
06-03-82	45081	N.M.	15.0	20.3	27.6	37.4	NGK #3
06-03-82	45089	N.M.	26.9	26.2	36.7	50.6	NGK #3
06-03-82	45098	N.M.	16.8	22.6	30.1	41.9	NGK #3
06-03-82	45118	N.M.	18.9	26.2	35.1	48.3	NGK #3
06-03-82	45128	N.M.	16.8	23.4	33.6	47.3	NGK #3
06-03-82	45137	N.M.	18.5	27.1	37.3	51.4	NGK #3
06-04-82	45149	N.M.	19.8	26.7	36.5	52.8	NGK #3
06-17-82	45149	Regeneration at Steady State					
06-22-82	45206	Regeneration at Steady State					
N.R.	45206	N.M.	11.0	16.9	23.0	31.2	NGK #3
06-23-82	45219	N.M.	11.3	15.8	21.8	32.2	NGK #3
06-23-82	45241	N.M.	19.3	24.7	35.5	48.7	NGK #3
06-23-82	45250	N.M.	17.8	23.0	32.5	46.7	NGK #3
06-28-82	45258	N.M.	16.2	22.6	30.8	45.18	NGK #3

Date	ODOM (mi)	--Exhaust Gas Backpressure (in of water)-- 20 mph	30 mph	40 mph	50 mph	60 mph	Trap
06-29-82	45285	N.M.	22.3	29.3	40.6	57.5	NGK #3
06-29-82	45293	N.M.	22.2	29.2	42.2	57.3	NGK #3
07-01-82	45305	N.M.	24.3	34.4	47.6	64.2	NGK #3
07-13-82	45315	N.M.	23.3	32.5	46.0	64.5	NGK #3
07-14-82	45325	N.M.	30.7	44.5	62.4	62.4	NGK #3
07-14-82	45336	N.M.	31.7	45.96	65.3	88.98	NGK #3
07-14-82	45346	N.M.	33.9	48.8	68.5	92.6	NGK #3
07-14-82	45356	N.M.	36.4	53.1	74.95	100.87	NGK #3
07-15-82	45382	N.M.	33.8	49.2	67.2	89.7	NGK #3
07-15-82	45390	N.M.	36.4	53.3	71.8	95.5	NGK #3
07-15-82	45399	N.M.	35.7	52.1	72.2	97.8	NGK #3
07-19-82	45409	N.M.	35.8	53.7	73.4	99.8	NGK #3
07-20-82	45421	N.M.	44.3	64.0	89.5	118.6	NGK #3
07-20-82	45443	N.M.	49.1	71.5	[illegible].6	122.7	NGK #3
07-20-82	45452	N.M.	46.8	106.5	[illegible].9	124.3	NGK #3
07-22-82	45471	N.M.	57.0	84.5	114.8	145.6	NGK #3
07-23-82	45486	Regeneration at Steady State					
07-25-82	45502	N.M.	20.48	32.5	46.3	68.2	NGK #3
07-28-82	45514	N.M.	25.6	39.7	57.6	82.9	NGK #3
07-28-82	45521	N.M.	27.4	43.0	58.7	79.8	NGK #3
07-29-82	45533	N.M.	27.8	41.9	61.2	81.2	NGK #3
07-29-82	45563	N.M.	34.8	56.2	76.3	104.5	NGK #3
07-29-82	45573	N.M.	34.0	52.7	76.9	108.4	NGK #3
07-30-82	45609	N.M.	40.8	64.5	91.7	124.2	NGK #3
07-30-82	45618	N.M.	35.9	61.9	87.2	120.9	NGK #3
08-02-82	45628	N.M.	40.2	65.2	91.2	125.8	NGK #3
08-02-82	45641	N.M.	49.6	75.2	107.6	143.2	NGK #3
08-04-82	45641	Regeneration at Steady State					
08-04-82	45662	N.M.	16.7	25.2	34.7	48.4	NGK #3
08-04-82	45670	N.M.	15.2	22.8	31.4	45.7	NGK #3
08-04-82	45678	N.M.	15.30	23.6	33.8	48.8	NGK #3
08-12-82	45706	N.M.	23.1	36.5	49.3	69.5	NGK #3
08-16-82	45717	N.M.	20.5	32.7	46.6	67.7	NGK #3
08-18-82	45728	N.M.	27.8	45.3	58.7	80.4	NGK #3
08-18-82	45148	N.M.	28.7	46.4	64.3	90.4	NGK #3
08-18-82	45757	N.M.	26.9	40.4	59.2	84.3	NGK #3
08-19-82	45769	N.M.	34.2	52.8	70.9	97.4	NGK #3
08-30-82	45778	N.M.	10.0	13.2	17.9	25.7	NGK #4
09-02-82	45790	N.M.	14.3	18.1	24.1	31.6	NGK #4
09-02-82	45810	N.M.	14.8	19.5	26.1	35.7	NGK #4
09-02-82	45819	N.M.	14.7	18.9	26.6	35.6	NGK #4
09-09-82	45828	N.M.	14.4	20.3	27.6	36.6	NGK #4
09-09-82	45836	N.M.	16.4	22.7	29.6	39.3	NGK #4
09-09-82	45845	N.M.	17.3	23.6	30.8	41.4	NGK #4
09-09-82	45853	N.M.	19.0	25.3	34.5	44.8	NGK #4
09-09-82	45862	N.M.	19.2	26.4	34.8	46.1	NGK #4
09-09-82	45871	N.M.	20.7	28.6	37.4	49.9	NGK #4
09-09-82	45879	N.M.	24.9	31.9	40.7	54.3	NGK #4
09-13-82	45888	N.M.	21.5	30.7	41.2	54.9	NGK #4
09-14-82	45900	N.M.	27.0	36.8	50.2	65.9	NGK #4
09-14-82	45920	N.M.	30.7	41.5	54.6	75.5	NGK #4
09-14-82	45928	N.M.	29.3	41.9	55.2	72.2	NGK #4
09-14-82	45955	N.M.	36.7	49.9	64.9	82.1	NGK #4
09-15-82	45976	N.M.	36.8	50.7	68.1	88.8	NGK #4
09-15-82	45985	N.M.	37.7	51.8	69.1	90.4	NGK #4
09-15-82	45999	N.M.	45.8	61.7	80.5	101.9	NGK #4
09-15-82	46012	N.M.	47.9	65.4	85.8	107.5	NGK #4
09-20-82	46017	N.M.	43.4	61.9	83.0	105.9	NGK #4
09-21-82	46033	N.M.	49.6	71.4	96.3	118.0	NGK #4
09-21-82	46044	Regeneration at Steady State					
09-21-82	46055	N.M.	18.6	28.2	39.4	52.0	NGK #4
09-21-82	46064	N.M.	18.6	30.2	40.2	52.2	NGK #4
09-22-82	46076	N.M.	29.3	40.5	56.4	73.7	NGK #4
09-22-82	46097	N.M.	34.4	48.5	64.0	84.5	NGK #4
09-22-82	46105	N.M.	36.4	51.4	68.7	89.7	NGK #4
09-23-82	46117	N.M.	42.2	58.6	78.2	101.3	NGK #4
09-23-82	46138	N.M.	48.9	66.0	90.5	114.0	NGK #4
09-23-82	46146	N.M.	47.6	69.2	92.2	117.5	NGK #4
09-28-82	46147	Regeneration at Steady State					

Date	ODOM (mi)	--Exhaust Gas Backpressure (in of water)--					Trap
		20 mph	30 mph	40 mph	50 mph	60 mph	
09-28-82	46169	N.M.	16.0	23.7	33.4	44.5	NGK #4
09-28-82	46177	N.M.	17.5	23.6	32.5	44.8	NGK #4
09-29-82	46189	N.M.	20.4	29.3	41.7	57.6	NGK #4
09-29-82	46209	N.M.	28.1	38.5	54.3	71.2	NGK #4
09-29-82	46218	N.M.	28.6	39.4	54.3	72.2	NGK #4
09-30-82	46230	N.M.	33.5	47.6	65.6	86.9	NGK #4
09-30-82	46251	N.M.	39.4	56.6	75.7	97.3	NGK #4
09-30-82	46259	N.M.	40.0	61.2	80.6	102.9	NGK #4
10-07-82	46253	Regeneration at Steady State					
10-07-82	46277	N.M.	18.2	27.0	38.3	51.2	NGK #4
10-12-82	46287	N.M.	19.09	27.0	37.5	50.5	NGK #4
10-13-82	46299	N.M.	24.7	33.5	45.7	60.9	NGK #4
10-13-82	46321	N.M.	28.2	39.9	55.0	73.1	NGK #4
10-13-82	46331	N.M.	32.8	45.1	59.9	78.7	NGK #4
10-14-82	46343	N.M.	36.6	52.7	72.8	82.0	NGK #4
10-14-82	46365	N.M.	40.2	56.0	75.2	98.9	NGK #4
10-14-82	46374	N.M.	41.5	59.3	79.7	104.4	NGK #4
10-18-82	46383	N.M.	44.9	64.0	87.5	111.1	NGK #4
10-19-82	46413	N.M.	59.7	81.6	109.1	138.9	NGK #4
10-19-82	46422	N.M.	62.0	86.2	115.9	148.5	NGK #4
10-21-82	46433	N.M.	76.7	108.0	140.2	169.1	NGK #4
10-21-82	46447	N.M.	87.2	123.5	154.9	190.9	NGK #4
10-26-82	46447	Regeneration at Steady State					
10-26-82	46472	N.M.	27.4	40.5	55.1	72.3	NGK #4
10-26-82	46482	N.M.	31.0	50.0	67.6	91.2	NGK #4
10-27-82	46508	N.M.	50.8	72.6	95.2	122.2	NGK #4
10-27-82	46517	N.M.	51.7	81.9	106.4	136.4	NGK #4
10-28-82	46529	N.M.	64.4	90.2	119.6	153.8	NGK #4
10-28-82	46550	N.M.	71.8	97.2	134.6	168.9	NGK #4
10-28-82	46559	N.M.	72.9	104.2	139.2	178.5	NGK #4
11-01-82	46569	N.M.	10.2	12.6	17.5	24.2	NGK #4-2
11-02-82	46581	N.M.	12.5	14.9	20.5	28.7	NGK #4-2
11-02-82	46601	N.M.	14.5	19.2	25.7	34.2	NGK #4-2
11-02-82	46610	N.M.	13.2	17.3	25.2	33.8	NGK #4-2
11-10-82	46631	N.M.	17.0	23.3	31.6	43.0	NGK #4-2
11-10-82	46660	N.M.	19.9	26.5	37.6	49.2	NGK #4-2
11-10-82	46651	N.M.	19.3	27.1	35.7	47.8	NGK #4-2
11-15-82	46660	N.M.	21.2	30.6	38.8	50.1	NGK #4-2
11-17-82	46680	N.M.	26.2	27.0	38.0	51.5	NGK #4-2
11-17-82	46701	N.M.	18.9	26.6	37.2	49.8	NGK #4-2
11-17-82	46728	N.M.	18.2	26.4	36.8	49.2	NGK #4-2
11-21-82	46737	N.M.	32.2	47.5	64.5	85.2	NGK #4-2
11-23-82	46749	N.M.	32.3	45.0	61.3	81.7	NGK #4-2
11-23-82	46770	N.M.	35.4	49.2	68.1	90.6	NGK #4-2
11-23-82	46797	N.M.	38.5	53.7	74.6	97.0	NGK #4-2
11-23-82	46805	N.M.	35.7	49.9	71.6	85.8	NGK #4-2
11-24-82	46817	N.M.	43.9	62.8	81.6	107.6	NGK #4-2
11-24-82	46838	N.M.	49.3	66.8	92.9	117.3	NGK #4-2
11-24-82	46865	N.M.	54.8	73.6	98.6	128.5	NGK #4-2
12-01-82	46865	Regeneration at Steady State					
12-01-82	46894	N.M.	29.8	43.2	58.9	76.2	NGK #4-2
12-01-82	46902	N.M.	30.6	40.5	58.1	76.2	NGK #4-2
12-02-82	46914	N.M.	38.3	52.6	72.8	96.0	NGK #4-2
12-02-82	46936	N.M.	46.6	63.0	83.0	113.5	NGK #4-2
12-02-82	46944	N.M.	43.6	67.5	84.1	107.9	NGK #4-2
12-03-82	46956	N.M.	53.9	77.2	101.4	125.4	NGK #4-2
12-03-82	46977	N.M.	55.2	77.1	103.9	134.9	NGK #4-2
12-07-82	46989	N.M.	62.2	87.1	110.4	142.0	NGK #4-2
12-08-82	46989	Regeneration at Steady State					
12-08-82	46989	N.M.	27.6	40.0	55.3	72.6	NGK #4-2
12-08-82	47041	N.M.	29.1	39.2	56.7	74.2	NGK #4-2
12-13-82	47049	N.M.	31.5	44.8	60.7	82.6	NGK #4-2
12-21-82	47058	N.M.	38.4	54.7	72.8	94.7	NGK #4-2
12-22-82	47070	N.M.	45.1	62.6	82.4	111.5	NGK #4-2
12-22-82	47092	N.M.	49.3	70.2	93.6	123.8	NGK #4-2
12-22-82	47101	N.M.	52.7	74.6	99.4	129.3	NGK #4-2
12-27-82	47109	N.M.	55.6	85.7	108.2	147.0	NGK #4-2
12-29-82	47121	N.M.	70.1	99.2	131.6	165.0	NGK #4-2
12-29-82	47143	N.M.	79.2	109.8	141.1	178.6	NGK #4-2

Appendix C-2

Exhaust Backpressure Data of Peugeot 504 Diesel

VEHICLE I.D. 504AC0-2700783 (1978 PEUGEOT 504)

Date	ODOM (km)	--Exhaust Gas Backpressure (in of water)-- 20 mph	30 mph	40 mph	50 mph	60 mph	Trap
11-28-79	8000	23.09	46.70	64.36	N.M.	N.M.	Johnson Matthey JM-4 #1
11-28-79	8021	20.70	39.39	60.30	N.M.	N.M.	Johnson Matthey JM-4 #1
11-28-79	8030	23.09	46.35	64.00	N.M.	N.M.	Johnson Matthey JM-4 #1
11-28-79	8038	27.10	53.61	66.18	N.M.	N.M.	Johnson Matthey JM-4 #1
11-30-79	8062	32.90	61.41	67.25	N.M.	N.M.	Johnson Matthey JM-4 #1
11-30-79	8087	35.35	63.63	68.30	N.M.	N.M.	Johnson Matthey JM-4 #1
12-03-79	8113	N.M.	63.61	68.99	N.M.	N.M.	Johnson Matthey JM-4 #1
12-04-79	8136	53.58	73.81	76.91	N.M.	N.M.	Johnson Matthey JM-4 #1
12-06-79	8161	63.79	N.M.	N.M.	N.M.	N.M.	Johnson Matthey JM-4 #1
12-06-79	8181	N.M.	71.38	N.M.	N.M.	N.M.	Johnson Matthey JM-4 #1
12-06-79	8207	57.38	N.M.	N.M.	N.M.	N.M.	Johnson Matthey JM-4 #1
12-07-79	8218	32.70	68.30	N.M.	N.M.	N.M.	Johnson Matthey JM-4 #1
12-07-79	8230	31.48	61.08	N.M.	N.M.	N.M.	Johnson Matthey JM-4 #1
12-07-79	8253	47.36	N.M.	N.M.	N.M.	N.M.	Johnson Matthey JM-4 #1
12-07-79	8276	26.76	55.08	N.M.	N.M.	N.M.	Johnson Matthey JM-4 #1
12-07-79	8301	51.38	N.M.	N.M.	N.M.	N.M.	Johnson Matthey JM-4 #1
12-07-79	8312	34.01	67.47	N.M.	N.M.	N.M.	Johnson Matthey JM-4 #1
12-07-79	8324	34.01	66.54	N.M.	N.M.	N.M.	Johnson Matthey JM-4 #1
12-07-79	8512	50.67	N.M.	N.M.	N.M.	N.M.	Johnson Matthey JM-4 #1
12-11-79	8533	37.35	72.96	N.M.	N.M.	N.M.	Johnson Matthey JM-4 #1
12-11-79	8550	50.70	N.M.	N.M.	N.M.	N.M.	Johnson Matthey JM-4 #1
12-11-79	8559	52.14	N.M.	N.M.	N.M.	N.M.	Johnson Matthey JM-4 #1
12-12-79	8571	47.06	N.M.	N.M.	N.M.	N.M.	Johnson Matthey JM-4 #1
12-12-79	8595	36.68	72.94	N.M.	N.M.	N.M.	Johnson Matthey JM-4 #1
12-12-79	8620	58.80	N.M.	N.M.	N.M.	N.M.	Johnson Matthey JM-4 #1
03-26-80	8736	N.M.	23.50	32.97	46.04	73.12	Johnson Matthey JM-4 #2
03-27-80	8747	N.M.	N.M.	33.45	47.35	70.81	Johnson Matthey JM-4 #2
03-27-80	8771	N.M.	24.16	33.45	48.67	70.81	Johnson Matthey JM-4 #2
03-27-80	8782	N.M.	24.16	32.73	47.35	69.38	Johnson Matthey JM-4 #2
03-27-80	8791	N.M.	23.94	32.25	46.83	69.38	Johnson Matthey JM-4 #2
03-28-80	8829	N.M.	24.16	33.45	47.62	69.38	Johnson Matthey JM-4 #2
03-28-80	8839	N.M.	23.72	31.53	46.04	69.67	Johnson Matthey JM-4 #2
03-28-80	8849	N.M.	23.28	32.73	48.67	70.81	Johnson Matthey JM-4 #2
03-31-80	8859	N.M.	N.M.	32.01	46.04	70.81	Johnson Matthey JM-4 #2
04-01-80	8869	N.M.	24.16	33.21	47.35	70.24	Johnson Matthey JM-4 #2
04-02-80	8893	N.M.	24.38	33.45	47.88	70.81	Johnson Matthey JM-4 #2
04-02-80	8910	N.M.	25.96	34.66	48.41	70.81	Johnson Matthey JM-4 #2
04-02-80	8926	N.M.	24.16	33.21	47.35	71.39	Johnson Matthey JM-4 #2
04-02-80	8935	N.M.	24.16	32.73	46.04	70.81	Johnson Matthey JM-4 #2
04-02-80	8946	N.M.	24.16	33.21	47.35	71.10	Johnson Matthey JM-4 #2
04-09-80	8969	N.M.	25.96	33.93	48.94	74.28	Johnson Matthey JM-4 #2
04-09-80	8993	N.M.	25.51	33.81	47.35	70.81	Johnson Matthey JM-4 #2
04-09-80	9004	N.M.	24.16	33.21	48.67	72.54	Johnson Matthey JM-4 #2
04-09-80	9014	N.M.	24.38	33.45	49.20	73.70	Johnson Matthey JM-4 #2
04-09-80	9024	N.M.	24.61	33.45	48.67	72.54	Johnson Matthey JM-4 #2
04-09-80	9035	N.M.	24.61	33.21	49.20	74.28	Johnson Matthey JM-4 #2
04-10-80	9049	N.M.	26.18	35.40	51.34	78.06	Johnson Matthey JM-4 #2
04-10-80	9073	N.M.	25.96	35.15	50.80	77.18	Johnson Matthey JM-4 #2
04-10-80	9084	N.M.	24.61	33.93	50.27	77.47	Johnson Matthey JM-4 #2
04-10-80	9094	N.M.	24.03	33.93	50.27	76.60	Johnson Matthey JM-4 #2
04-10-80	9104	N.M.	25.51	33.93	50.27	76.60	Johnson Matthey JM-4 #2
04-11-80	9115	N.M.	25.28	34.18	50.53	73.70	Johnson Matthey JM-4 #2
04-11-80	9125	N.M.	24.61	34.18	50.80	76.60	Johnson Matthey JM-4 #2
04-16-80	9142	N.M.	N.M.	41.40	59.52	87.80	Johnson Matthey JM-4 #2
04-16-80	9152	N.M.	28.71	40.38	57.04	84.83	Johnson Matthey JM-4 #2
04-16-80	9164	N.M.	28.94	40.89	59.52	86.01	Johnson Matthey JM-4 #2
04-16-80	9176	N.M.	28.48	39.62	58.14	84.83	Johnson Matthey JM-4 #2
04-16-80	9189	N.M.	28.71	40.38	57.86	85.42	Johnson Matthey JM-4 #2
04-16-80	9202	N.M.	29.18	40.89	59.52	86.01	Johnson Matthey JM-4 #2
04-16-80	9213	N.M.	26.64	36.63	55.40	88.39	Johnson Matthey JM-4 #2
04-16-80	9223	N.M.	26.87	38.87	55.67	85.72	Johnson Matthey JM-4 #2
04-16-80	9233	N.M.	28.02	38.37	57.59	87.20	Johnson Matthey JM-4 #2
04-17-80	9246	N.M.	25.51	34.66	49.20	76.02	Johnson Matthey JM-4 #2
04-17-80	9256	N.M.	25.28	33.69	48.67	73.12	Johnson Matthey JM-4 #2
04-17-80	9265	N.M.	29.28	33.93	49.20	73.99	Johnson Matthey JM-4 #2
04-17-80	9288	N.M.	26.41	35.89	50.27	72.88	Johnson Matthey JM-4 #2
04-17-80	9298	N.M.	27.56	39.37	56.76	85.42	Johnson Matthey JM-4 #2
04-17-80	9307	N.M.	28.34	38.87	54.85	85.42	Johnson Matthey JM-4 #2
04-22-80	9329	N.M.	26.41	35.40	50.80	73.70	Johnson Matthey JM-4 #2

Appendix C-3

Exhaust Backpressure on Toyota Crown Diesel

(Caution: Odometer values for this
vehicle are given in kilometers.)

VEHICLE I.D. K-LS110-SEMFSY (1981 TOYOTA CROWN SUPER DELUXE)

Date	ODOM (mi)	--Exhaust Gas Backpressure (in of water)--					Trap
		20 mph	30 mph	40 mph	50 mph	60 mph	
09-02-81	1863	N.M.	7.9	9.4	9.8	12.5	Dummy Trap
09-03-81	1875	N.M.	4.5	6.3	10.1	12.0	Dummy Trap
09-10-81	2058	N.M.	4.4	6.1	9.8	11.5	Dummy Trap
09-15-81	2154	N.M.	4.3	5.9	9.9	11.4	Dummy Trap
09-17-81	2228	N.M.	4.7	6.5	10.6	12.5	Dummy Trap
09-22-81	2307	N.M.	4.4	6.3	10.3	11.7	Dummy Trap
09-22-81	2343	N.M.	7.3	11.4	14.9	21.9	ICI Saffil fourth Generation
09-24-81	2385	N.M.	7.96	12.0	16.6	22.6	ICI Saffil fourth Generation
10-01-81	2456	N.M.	8.0	12.4	18.1	24.97	ICI Saffil fourth Generation
10-01-81	2496	N.M.	8.8	13.4	18.5	24.5	ICI Saffil fourth Generation
10-01-81	2527	N.M.	8.2	13.3	18.6	24.1	ICI Saffil fourth Generation
10-01-81	2564	N.M.	N.M.	13.2	17.9	23.8	ICI Saffil fourth Generation
10-07-81	2623	N.M.	8.8	13.3	18.7	25.2	ICI Saffil fourth Generation
10-07-81	2633	N.M.	9.5	14.7	20.5	27.1	ICI Saffil fourth Generation
10-07-81	2653	N.M.	8.8	14.2	19.6	26.9	ICI Saffil fourth Generation
10-08-81	2678	N.M.	9.0	13.8	19.3	25.95	ICI Saffil fourth Generation
10-08-81	2717	N.M.	9.5	14.4	20.2	26.9	ICI Saffil fourth Generation
10-08-81	2735	N.M.	9.0	14.2	19.9	27.0	ICI Saffil fourth Generation
10-20-81	2777	N.M.	4.3	6.3	9.8	11.5	Dummy Trap
10-21-81	2915	N.M.	3.8	8.8	10.3	12.2	Dummy Trap
10-22-81	2948	N.M.	9.09	12.56	18.55	25.46	NGK #1
10-27-81	2983	N.M.	10.5	14.1	20.8	28.2	NGK #1
10-27-81	3021	N.M.	11.5	15.5	22.7	30.5	NGK #1
10-27-81	3036	N.M.	11.2	15.4	22.8	30.7	NGK #1
10-28-81	3108	N.M.	12.9	17.99	25.7	34.97	NGK #1
10-28-81	3125	N.M.	11.7	17.2	24.5	34.5	NGK #1
10-29-81	3163	N.M.	13.8	19.1	27.7	37.4	NGK #1
10-29-81	3215	N.M.	14.8	20.6	28.9	39.2	NGK #1
10-29-81	3244	N.M.	13.8	20.3	29.7	40.5	NGK #1
10-29-81	3262	N.M.	14.2	20.8	30.4	41.4	NGK #1
10-30-81	3312	N.M.	15.7	22.2	32.0	43.6	NGK #1
10-30-81	3338	N.M.	16.8	23.8	33.8	45.7	NGK #1
11-05-81	3487	N.M.	20.2	30.4	43.9	60.3	NGK #1
11-10-81	3602	N.M.	23.18	35.18	50.90	70.48	NGK #1
11-12-81	3632	N.M.	24.10	37.0	52.9	73.3	NGK #1
11-12-81	3675	N.M.	27.3	39.9	56.0	76.5	NGK #1
11-12-81	3699	N.M.	27.0	40.4	57.8	78.6	NGK #1
11-12-81	3734	N.M.	29.0	44.9	62.8	84.9	NGK #1
11-18-81	3867	N.M.	38.9	58.7	82.0	104.28	NGK #1
11-18-81	3909	N.M.	41.38	57.98	78.5	105.6	NGK #1
11-18-81	3913	N.M.	43.9	61.4	83.3	108.8	NGK #1
11-18-81	3952	N.M.	44.6	64.3	87.3	114.8	NGK #1
11-18-81	3990	N.M.	45.0	65.7	89.6	117.5	NGK #1
11-18-81	4030	N.M.	46.3	65.7	89.6	119.3	NGK #1
11-18-81	4053	Regeneration at Steady State					
11-19-81	4098	N.M.	8.0	13.8	21.9	30.0	NGK #1
11-19-81	4138	N.M.	10.0	15.5	23.6	31.2	NGK #1
11-19-81	4162	N.M.	10.0	15.4	23.7	33.5	NGK #1
11-25-81	4195	N.M.	10.8	17.1	26.2	34.7	NGK #1
11-25-81	4234	N.M.	12.0	18.3	27.1	36.8	NGK #1
11-25-81	4251	N.M.	12.5	19.5	29.5	39.9	NGK #1
12-01-81	4252	N.M.	13.88	20.58	29.68	41.58	NGK #1
12-01-81	4268	N.M.	13.98	21.28	30.38	42.68	NGK #1
12-01-81	4294	N.M.	13.98	21.48	31.58	44.08	NGK #1
12-01-81	4321	N.M.	15.28	22.7	32.6	45.5	NGK #1
12-01-81	4339	N.M.	15.9	22.8	33.2	46.4	NGK #1
12-01-81	4356	N.M.	17.0	24.9	35.8	49.4	NGK #1
12-01-81	4373	N.M.	18.0	25.8	37.3	51.0	NGK #1
12-03-81	4390	N.M.	17.9	27.08	39.03	54.16	NGK #1
12-03-81	4410	N.M.	19.9	28.4	40.9	55.6	NGK #1
12-03-81	4426	N.M.	21.0	30.5	42.5	57.7	NGK #1
12-03-81	4443	N.M.	21.0	31.1	43.8	59.3	NGK #1
12-03-81	4460	N.M.	21.9	31.8	45.1	61.4	NGK #1
12-03-81	4476	N.M.	22.6	33.7	47.3	63.1	NGK #1
12-03-81	4492	N.M.	24.7	36.2	50.5	67.1	NGK #1
12-03-81	4509	N.M.	25.0	36.6	50.8	67.9	NGK #1
12-03-81	4526	N.M.	25.0	37.2	52.6	70.4	NGK #1

	ODOM	--Exhaust Gas Backpressure (in of water)--					
Date	(km)	20 mph	30 mph	40 mph	50 mph	60 mph	Trap
12-04-81	4545	N.M.	26.9	38.9	55.1	74.0	NGK #1
12-04-81	4560	N.M.	27.9	40.6	56.5	76.0	NGK #1
12-04-81	4578	N.M.	28.9	42.0	58.8	78.8	NGK #1
12-04-81	4595	N.M.	31.0	44.4	61.3	82.2	NGK #1
12-08-81	4631	N.M.	33.0	49.4	68.7	91.2	NGK #1
12-08-81	4669	N.M.	36.8	52.6	71.5	94.0	NGK #1
12-08-81	4686	N.M.	35.8	52.4	72.2	95.4	NGK #1
12-10-81	4708	N.M.	37.5	55.6	76.7	102.1	NGK #1
12-10-81	4733	N.M.	40.5	59.1	80.0	104.2	NGK #1
12-10-81	4761	N.M.	41.8	60.2	82.9	108.2	NGK #1
12-11-81	4763	Regeneration at Steady State					
12-15-81	4827	N.M.	6.6	10.5	17.5	21.7	NGK #1
12-15-81	4864	N.M.	7.5	11.7	18.4	23.5	NGK #1
12-15-81	4880	N.M.	6.6	11.4	18.3	23.3	NGK #1
12-16-81	4901	N.M.	8.0	13.1	20.3	25.5	NGK #1
12-16-81	4938	N.M.	9.5	14.0	21.6	28.1	NGK #1
12-16-81	4953	N.M.	8.4	13.8	21.4	27.9	NGK #1
12-17-81	4970	N.M.	10.28	16.5	25.4	35.08	NGK #1
12-17-81	4986	N.M.	10.88	17.4	26.5	35.98	NGK #1
12-17-81	5002	N.M.	10.88	16.98	25.5	35.56	NGK #1
12-18-81	5019	N.M.	10.88	17.28	26.9	36.8	NGK #1
12-18-81	5039	N.M.	11.1	17.7	27.2	37.2	NGK #1
12-18-81	5053	N.M.	11.4	18.5	28.0	38.6	NGK #1
12-18-81	5070	N.M.	11.9	18.8	28.3	39.1	NGK #1
12-29-80	5087	N.M.	11.08	16.9	25.3	35.3	NGK #1
12-29-80	5103	N.M.	12.6	18.6	27.3	37.9	NGK #1
12-29-80	5119	N.M.	13.9	20.6	30.2	41.3	NGK #1
12-29-80	5135	N.M.	14.8	21.7	31.5	43.2	NGK #1
12-29-80	5151	N.M.	15.7	22.8	33.0	44.9	NGK #1
12-29-80	5167	N.M.	16.8	24.3	34.7	47.5	NGK #1
12-29-80	5185	N.M.	17.3	25.1	36.4	50.1	NGK #1
12-29-80	5201	N.M.	17.9	25.8	37.0	51.0	NGK #1
12-29-80	5217	N.M.	18.1	26.5	37.8	51.7	NGK #1
12-29-80	5232	N.M.	18.6	27.6	39.0	52.7	NGK #1
12-29-81	5248	N.M.	20.3	30.6	42.7	57.0	NGK #1
12-29-81	5266	N.M.	20.9	30.3	43.7	58.5	NGK #1
12-29-81	5281	N.M.	22.0	31.4	43.9	60.0	NGK #1
01-05-82	5297	N.M.	20.2	29.9	42.3	56.4	NGK #1
01-05-82	5313	N.M.	21.2	31.6	45.2	60.1	NGK #1
01-05-82	5328	N.M.	22.1	33.2	47.3	62.6	NGK #1
01-05-82	5345	N.M.	23.1	34.5	49.0	64.7	NGK #1
01-05-82	5361	N.M.	22.9	34.5	49.0	65.3	NGK #1
01-05-82	5377	N.M.	21.6	32.8	46.7	62.8	NGK #1
01-05-82	5393	N.M.	22.0	33.7	48.1	65.3	NGK #1
01-06-82	5421	N.M.	26.98	39.7	55.4	73.2	NGK #1
01-06-82	5458	N.M.	32.0	44.4	60.6	80.1	NGK #1
01-07-82	5481	N.M.	26.7	39.3	54.7	75.4	NGK #1
01-07-82	5519	N.M.	30.3	42.9	59.3	80.3	NGK #1
01-07-82	5556	N.M.	31.5	46.0	64.2	85.4	NGK #1
01-07-82	5512	N.M.	30.2	43.7	61.5	83.6	NGK #1
01-08-82	5593	N.M.	30.5	46.2	65.1	88.4	NGK #1
01-08-82	5595	Regeneration at Steady State					
01-12-82	5660	N.M.	6.6	12.0	20.0	24.8	NGK #1
01-12-82	5697	N.M.	8.9	13.5	22.3	27.7	NGK #1
01-12-82	5725	N.M.	8.2	14.0	22.7	29.9	NGK #1
01-13-82	5749	N.M.	10.80	16.0	24.90	32.25	NGK #1
01-13-82	5789	N.M.	11.7	16.3	24.6	32.0	NGK #1
01-13-82	5806	N.M.	11.7	17.2	26.1	34.3	NGK #1
03-09-82	6001	Regeneration at Steady State				Dummy	
03-10-82	6073	Regeneration at Steady State				Dummy	
03-10-82	6107	Regeneration at Steady State				Dummy	
03-10-82	6145	N.M.	61.9	96.3	145.9	203.1	WR Grace U13U13U25U25U30U30
03-15-82	6224	N.M.	13.7	24.6	40.2	60.4	WR Grace U13U13 w 8" Spcr.
03-16-82	6248	N.M.	14.9	27.1	44.2	67.1	WR Grace U13U13 w 8" Spcr.
03-23-82	6318	N.M.	18.88	34.09	55.6	81.8	WR Grace U13U13 w 8" Spcr.
03-23-82	6358	N.M.	22.9	38.0	60.2	88.1	WR Grace U13U13 w 8" Spcr.
03-23-82	6374	N.M.	20.7	37.5	60.2	98.9	WR Grace U13U13 w 8" Spcr.

	ODOM	--Exhaust Gas Backpressure (in of water)--					
Date	(km)	20 mph	30 mph	40 mph	50 mph	60 mph	Trap
03-24-82	6391	N.M.	22.08	40.68	62.2	94.9	WR Grace U25U25 w 8" Spcr.
03-25-82	6413	N.M.	28.3	53.7	79.7	117.4	WR Grace U25U25 w 8" Spcr.
03-26-82	6452	N.M.	31.1	59.2	92.1	135.6	WR Grace U25U25 w 8" Spcr.
03-26-82	6469	N.M.	36.3	65.3	102.5	151.9	WR Grace U25U25 w 8" Spcr.
03-29-82	6485	N.M.	39.9	69.1	108.4	160.1	WR Grace U25U25 w 8" Spcr.
03-30-82	6524	N.M.	46.3	80.3	124.5	182.1	WR Grace U25U25 w 8" Spcr.
03-30-82	6540	N.M.	50.9	90.4	140.1	200.7	WR Grace U25U25 w 8" Spcr.
N.R.	6585	N.M.	40.1	75.0	121.5	182.8	WR Grace CA13CA13 w 8" Spcr.
04-05-82	6602	N.M.	42.6	76.0	121.0	180.5	WR Grace CA13CA13 w 8" Spcr.
04-06-82	6629	N.M.	52.4	92.9	148.0	226.7	WR Grace CA13CA13 w 8" Spcr.
04-23-82	6838	N.M.	18.08	31.6	50.3	75.6	Toyota Foam Non-Cat.
04-27-82	6861	N.M.	19.1	35.7	56.0	84.0	Toyota Foam Non-Cat.
04-28-82	6880	N.M.	19.9	36.6	58.1	85.8	Toyota Foam Non-Cat.
04-28-82	6919	N.M.	21.9	39.7	60.6	89.1	Toyota Foam Non-Cat.
04-28-82	6958	N.M.	19.9	38.6	59.3	90.6	Toyota Foam Non-Cat.
05-04-82	6979	N.M.	20.8	37.8	59.7	90.2	Toyota Foam Non-Cat.
05-04-82	7017	N.M.	20.8	39.6	63.2	91.5	Toyota Foam Non-Cat.
05-05-82	7033	N.M.	20.9	37.2	63.7	97.4	Toyota Foam Non-Cat.
05-05-82	7048	N.M.	21.8	39.5	62.7	92.7	Toyota Foam Non-Cat.
05-06-82	7065	N.M.	22.6	40.2	63.1	95.9	Toyota Foam Non-Cat.
05-06-82	7080	N.M.	23.2	39.2	63.5	93.3	Toyota Foam Non-Cat.
05-06-82	7075	N.M.	22.1	39.2	64.0	94.7	Toyota Foam Non-Cat.
05-06-82	7111	N.M.	23.7	40.5	64.4	95.2	Toyota Foam Non-Cat.
05-06-82	7126	N.M.	25.7	42.1	66.2	99.7	Toyota Foam Non-Cat.
05-06-82	7141	N.M.	24.2	43.2	66.7	99.5	Toyota Foam Non-Cat.
05-06-82	7156	N.M.	24.6	44.2	71.5	102.2	Toyota Foam Non-Cat.
05-06-82	7171	N.M.	25.2	44.1	69.1	103.2	Toyota Foam Non-Cat.
05-06-82	7186	N.M.	24.2	43.2	70.1	104.6	Toyota Foam Non-Cat.
05-06-82	7202	N.M.	24.8	44.1	68.9	106.8	Toyota Foam Non-Cat.
05-06-82	7217	N.M.	25.9	44.6	70.6	104.7	Toyota Foam Non-Cat.
05-06-82	7233	N.M.	24.3	42.9	70.1	105.7	Toyota Foam Non-Cat.
05-06-82	7250	N.M.	25.9	44.1	70.3	106.4	Toyota Foam Non-Cat.
05-06-82	7266	N.M.	26.8	45.3	74.2	108.9	Toyota Foam Non-Cat.
05-11-82	7281	N.M.	27.9	47.2	72.2	110.2	Toyota Foam Non-Cat.
05-12-82	7296	N.M.	26.2	46.2	73.9	114.5	Toyota Foam Non-Cat.
05-12-82	7311	N.M.	29.2	49.6	80.5	120.5	Toyota Foam Non-Cat.
05-12-82	7326	N.M.	27.8	47.6	82.8	119.2	Toyota Foam Non-Cat.
05-12-82	7341	N.M.	28.9	48.6	80.2	120.2	Toyota Foam Non-Cat.
05-12-82	7356	N.M.	31.3	52.5	78.6	125.6	Toyota Foam Non-Cat.
05-19-82	7376	N.M.	27.8	48.6	79.2	119.8	Toyota Foam Non-Cat.
05-19-82	7412	N.M.	30.7	53.2	83.5	126.2	Toyota Foam Non-Cat.
05-19-82	7427	N.M.	28.8	48.1	79.5	116.3	Toyota Foam Non-Cat.
05-20-82	7447	N.M.	29.8	53.2	84.2	123.4	Toyota Foam Non-Cat.
05-24-82	7463	N.M.	27.9	50.7	78.4	116.8	Toyota Foam Non-Cat.
05-26-82	7484	N.M.	27.8	53.9	83.5	123.9	Toyota Foam Non-Cat.
05-26-82	7520	N.M.	32.8	53.4	88.7	129.2	Toyota Foam Non-Cat.
05-26-82	7534	N.M.	30.2	54.1	85.4	126.1	Toyota Foam Non-Cat.
06-01-82	7575	N.M.	30.0	52.2	83.5	124.4	Toyota Foam Non-Cat.
06-02-82	7596	N.M.	31.8	54.3	85.2	127.3	Toyota Foam Non-Cat.
06-02-82	7634	N.M.	28.8	50.9	80.7	117.6	Toyota Foam Non-Cat.
06-03-82	7655	N.M.	30.8	57.6	89.7	128.3	Toyota Foam Non-Cat.
06-03-82	7679	N.M.	31.0	55.4	88.6	128.4	Toyota Foam Non-Cat.
06-03-82	7695	N.M.	29.8	54.3	87.5	127.2	Toyota Foam Non-Cat.
06-03-82	7711	N.M.	30.8	57.5	91.0	131.7	Toyota Foam Non-Cat.
06-09-82	7746	N.M.	32.6	60.1	94.7	136.5	Toyota Foam Non-Cat.
06-09-82	7784	N.M.	34.6	61.0	97.4	140.8	Toyota Foam Non-Cat.
06-09-82	7800	N.M.	31.8	58.7	94.6	142.1	Toyota Foam Non-Cat.
06-09-82	7837	N.M.	34.8	64.6	97.2	143.7	Toyota Foam Non-Cat.
06-09-82	7852	N.M.	30.5	55.8	87.7	129.3	Toyota Foam Non-Cat.
06-09-82	7867	N.M.	32.6	59.2	94.0	135.8	Toyota Foam Non-Cat.
06-10-82	7911	N.M.	32.8	60.1	92.5	138.2	Toyota Foam Non-Cat.
06-14-82	7953	N.M.	32.2	57.6	88.2	131.4	Toyota Foam Non-Cat.
06-22-82	8015	Regeneration at Steady State					
06-22-82	8013	N.M.	20.4	35.0	55.2	84.1	Toyota Foam Non-Cat.
06-23-82	8044	N.M.	19.5	36.9	60.1	88.1	Toyota Foam Non-Cat.
06-25-82	8065	N.M.	21.7	38.6	62.6	91.0	Toyota Foam Non-Cat.
07-02-82	8154	N.M.	24.1	43.5	70.9	103.5	Toyota Foam Non-Cat.

	ODOM	--Exhaust Gas Backpressure (in of water)--					
Date	(km)	20 mph	30 mph	40 mph	50 mph	60 mph	Trap
07-07-82	8182	N.M.	22.3	41.8	66.3	102.5	Toyota Foam Non-Cat.
07-08-82	8197	N.M.	23.2	41.2	64.8	97.2	Toyota Foam Non-Cat.
07-08-82	8212	N.M.	21.7	42.6	65.8	102.3	Toyota Foam Non-Cat.
07-08-82	8226	N.M.	22.8	41.1	63.7	101.9	Toyota Foam Non-Cat.
07-08-82	8242	N.M.	22.6	41.6	65.4	98.5	Toyota Foam Non-Cat.
07-09-82	8257	N.M.	23.6	42.7	67.0	105.6	Toyota Foam Non-Cat.
07-09-82	8272	N.M.	24.7	44.2	70.0	109.5	Toyota Foam Non-Cat.
07-09-82	8286	N.M.	24.7	47.6	73.2	108.2	Toyota Foam Non-Cat.
07-09-82	8301	N.M.	24.7	47.2	73.3	113.2	Toyota Foam Non-Cat.
07-09-82	8317	N.M.	24.7	45.6	73.2	109.2	Toyota Foam Non-Cat.
07-13-82	8333	N.M.	24.8	47.1	75.3	116.5	Toyota Foam Non-Cat.
07-13-82	8348	N.M.	26.7	48.9	78.1	116.8	Toyota Foam Non-Cat.
07-13-82	8362	N.M.	25.8	48.8	80.3	120.5	Toyota Foam Non-Cat.
07-14-82	8377	N.M.	28.2	49.0	81.2	121.5	Toyota Foam Non-Cat.
07-14-82	8393	N.M.	29.2	52.3	81.9	122.3	Toyota Foam Non-Cat.
07-14-82	8408	N.M.	30.6	54.3	86.3	131.5	Toyota Foam Non-Cat.
07-14-82	8423	N.M.	30.7	56.6	88.0	133.2	Toyota Foam Non-Cat.
07-14-82	8439	N.M.	31.6	55.3	85.7	136.7	Toyota Foam Non-Cat.
07-14-82	8455	N.M.	31.5	58.9	92.1	135.7	Toyota Foam Non-Cat.
07-14-82	8469	N.M.	30.7	55.6	92.2	131.4	Toyota Foam Non-Cat.
07-14-82	8484	N.M.	31.4	56.7	91.2	135.3	Toyota Foam Non-Cat.
07-15-82	8505	N.M.	32.9	57.3	92.4	135.3	Toyota Foam Non-Cat.
07-16-82	8542	N.M.	32.8	60.5	94.6	133.2	Toyota Foam Non-Cat.
07-16-82	8557	N.M.	32.6	59.2	92.7	138.6	Toyota Foam Non-Cat.
07-19-82	8563	N.M.	32.0	55.6	88.9	129.2	Toyota Foam Non-Cat.
07-20-82	8593	N.M.	31.5	58.3	93.5	142.5	Toyota Foam Non-Cat.
07-20-82	8630	N.M.	34.6	62.2	100.2	143.0	Toyota Foam Non-Cat.
07-20-82	8650	N.M.	31.3	58.0	92.5	135.0	Toyota Foam Non-Cat.
07-21-82	8672	N.M.	35.8	63.2	98.8	141.7	Toyota Foam Non-Cat.
07-21-82	8685	N.M.	38.9	64.3	98.5	140.3	Toyota Foam Non-Cat.
07-21-82	8700	N.M.	34.4	61.2	98.9	142.6	Toyota Foam Non-Cat.
07-26-82	8715	N.M.	28.9	53.8	87.0	129.6	Toyota Foam Non-Cat.
07-27-82	8737	N.M.	34.2	62.5	97.3	145.9	Toyota Foam Non-Cat.
08-13-82	8774	N.M.	36.2	63.7	105.5	143.7	Toyota Foam Non-Cat.
08-13-82	8789	N.M.	35.2	65.7	103.7	140.2	Toyota Foam Non-Cat.
08-13-82	8804	N.M.	39.5	66.5	99.2	145.5	Toyota Foam Non-Cat.
08-19-82	8819	N.M.	36.8	64.4	100.3	143.7	Toyota Foam Non-Cat.
08-19-82	8834	N.M.	36.8	65.4	104.5	145.5	Toyota Foam Non-Cat.
08-19-82	8849	N.M.	35.6	67.4	108.7	152.8	Toyota Foam Non-Cat.
08-19-82	8880	Regeneration at Steady State					
08-19-82	8880	N.M.	19.8	36.2	57.3	87.0	Toyota Foam Non-Cat.
08-19-82	8894	N.M.	18.2	35.4	54.2	84.5	Toyota Foam Non-Cat.
08-20-82	8916	N.M.	19.9	37.9	57.2	92.7	Toyota Foam Non-Cat.
08-20-82	8952	N.M.	20.5	37.6	60.1	90.2	Toyota Foam Non-Cat.
08-20-82	8967	N.M.	20.0	38.2	60.4	92.4	Toyota Foam Non-Cat.
08-26-82	9041	N.M.	23.2	44.1	70.4	104.3	Toyota Foam Non-Cat.
08-26-82	9056	N.M.	21.7	42.1	72.1	103.2	Toyota Foam Non-Cat.
08-30-82	9057	N.M.	7.2	12.8	21.3	27.3	Bridgestone #1
08-31-82	9093	N.M.	8.4	15.9	25.3	33.9	Bridgestone #1
08-31-82	9131	N.M.	9.5	16.1	27.0	36.2	Bridgestone #1
08-31-82	9146	N.M.	8.5	15.6	25.7	37.2	Bridgestone #1
09-15-82	9162	N.M.	8.8	15.7	26.4	35.5	Bridgestone #1
09-17-82	9219	N.M.	13.49	21.54	33.88	46.89	Bridgestone #1
09-17-82	924[illegible]	N.M.	14.19	23.30	35.65	49.3	Bridgestone #1
09-17-82	9263	N.M.	14.19	22.95	35.66	50.95	Bridgestone #1
09-17-82	9285	N.M.	9.58	17.9	29.7	42.4	Bridgestone #1
09-23-82	9300	N.M.	8.8	15.2	27.8	39.2	Bridgestone #1
09-23-82	9316	N.M.	9.0	16.1	27.9	41.4	Bridgestone #1
10-05-82	9332	N.M.	9.1	18.5	31.5	45.7	Bridgestone #1
10-05-82	9344	N.M.	9.6	19.5	31.5	46.0	Bridgestone #1
10-05-82	9359	N.M.	10.0	19.2	32.5	48.6	Bridgestone #1
10-06-82	9374	N.M.	10.5	19.8	32.9	47.9	Bridgestone #1
10-06-82	9389	N.M.	11.5	20.8	34.5	48.7	Bridgestone #1
10-06-82	9403	N.M.	12.4	21.6	35.8	50.5	Bridgestone #1

Date	ODOM (km)	--Exhaust Gas Backpressure (in of water)--					Trap
		20 mph	30 mph	40 mph	50 mph	60 mph	
10-19-82	9419	N.M.	9.8	18.2	30.1	44.2	Bridgestone #1-2
10-20-82	9441	N.M.	13.1	24.2	38.5	56.5	Bridgestone #1-2
10-20-82	9477	N.M.	18.5	31.9	50.4	72.5	Bridgestone #1-2
10-20-82	9492	N.M.	20.9	36.8	56.2	81.5	Bridgestone #1-2
10-21-82	9531	N.M.	24.3	42.7	65.5	94.1	Bridgestone #1-2
10-21-82	9551	N.M.	34.1	57.7	86.2	120.9	Bridgestone #1-2
10-21-82	9567	N.M.	36.9	63.5	95.2	136.5	Bridgestone #1-2
N.R.	9583	N.M.	43.0	74.4	110.3	154.7	Bridgestone #1-2
10-26-82	9599	Regeneration at Steady State					
10-26-82	9642	N.M.	17.2	30.1	50.0	73.1	Bridgestone #1-2
10-26-82	9657	N.M.	18.1	31.2	43.7	70.3	Bridgestone #1-2
10-28-82	9678	N.M.	18.6	31.8	50.0	74.6	Bridgestone #1-2
10-28-82	9714	N.M.	26.1	44.2	68.8	97.6	Bridgestone #1-2
10-28-82	9729	N.M.	26.5	46.9	72.6	103.5	Bridgestone #1-2
10-29-82	9749	N.M.	33.5	58.5	88.8	124.5	Bridgestone #1-2
10-29-82	9785	N.M.	42.6	71.4	104.1	145.5	Bridgestone #1-2
10-29-82	9800	N.M.	42.5	72.4	108.5	153.3	Bridgestone #1-2
11-02-82	9800	Regeneration at Steady State					
11-02-82	9867	N.M.	13.5	24.5	39.2	57.6	Bridgestone #1-2
11-02-82	9882	N.M.	11.5	20.9	34.6	51.7	Bridgestone #1-2
11-03-82	9903	N.M.	14.9	26.2	42.3	60.5	Bridgestone #1-2
11-03-82	9939	N.M.	19.8	32.9	51.4	74.0	Bridgestone #1-2
11-03-82	9953	N.M.	21.5	36.6	55.1	82.2	Bridgestone #1-2
11-10-82	9990	N.M.	31.4	52.5	79.4	110.2	Bridgestone #1-2
11-15-82	10005	N.M.	30.0	50.2	76.8	113.5	Bridgestone #1-2
11-16-82	10026	N.M.	38.2	64.4	96.4	137.2	Bridgestone #1-2
11-16-82	10062	N.M.	54.7	88.4	128.6	176.3	Bridgestone #1-2
11-16-82	10110	N.M.	62.5	102.6	149.1	211.0	Bridgestone #1-2
11-17-82	10110	Regeneration at Steady State					
11-17-82	10161	N.M.	16.2	29.6	46.4	69.5	Bridgestone #1-2
11-17-82	10174	N.M.	13.7	25.5	41.2	61.9	Bridgestone #1-2
11-18-82	10195	N.M.	14.2	27.6	44.0	65.5	Bridgestone #1-2
11-18-82	10231	N.M.	20.8	36.6	57.0	83.7	Bridgestone #1-2
11-18-82	10278	N.M.	30.1	54.0	79.2	110.9	Bridgestone #1-2
11-21-82	10293	N.M.	30.6	52.3	84.2	125.8	Bridgestone #1-2
11-23-82	10313	N.M.	33.3	59.2	87.7	127.9	Bridgestone #1-2
11-23-82	10350	N.M.	40.3	67.8	102.5	145.5	Bridgestone #1-2
11-24-82	10350	Regeneration at Steady State					
11-24-82	10402	N.M.	17.5	31.6	49.2	72.2	Bridgestone #1-2
11-29-82	10418	N.M.	13.6	24.7	40.4	62.7	Bridgestone #1-2
11-30-82	10439	N.M.	17.8	33.0	52.7	81.2	Bridgestone #1-2
11-30-82	10475	N.M.	25.7	45.2	70.0	101.6	Bridgestone #1-2
11-30-82	10490	N.M.	25.6	45.3	70.6	103.6	Bridgestone #1-2
11-30-82	10511	N.M.	30.8	54.5	82.3	117.5	Bridgestone #1-2
11-30-82	10548	N.M.	38.9	69.8	103.3	143.6	Bridgestone #1-2
12-07-82	10551	Regeneration at Steady State					
12-07-82	10590	N.M.	18.0	31.6	49.7	72.3	Bridgestone #1-2
12-07-82	10604	N.M.	17.0	29.3	44.2	61.2	Bridgestone #1-2
12-08-82	10625	N.M.	17.7	31.5	49.4	74.8	Bridgestone #1-2
12-08-82	10662	N.M.	25.6	43.2	67.3	96.4	Bridgestone #1-2
12-08-82	10677	N.M.	26.6	45.0	68.7	103.9	Bridgestone #1-2
12-10-82	10697	N.M.	32.8	54.3	78.2	112.7	Bridgestone #1-2
12-10-82	10733	N.M.	42.7	68.9	103.2	144.1	Bridgestone #1-2
12-15-82	10733	Regeneration at Steady State					
12-15-82	10779	N.M.	14.0	24.6	37.9	54.1	Bridgestone #1-2
12-15-82	10793	N.M.	13.0	23.2	35.2	47.0	Bridgestone #1-2
12-16-82	10815	N.M.	15.1	25.9	40.5	61.6	Bridgestone #1-2
12-16-82	10850	N.M.	19.8	34.9	53.3	77.4	Bridgestone #1-2
12-16-82	10865	N.M.	21.5	37.6	54.7	79.9	Bridgestone #1-2
12-27-82	10879	N.M.	24.7	41.2	61.4	88.9	Bridgestone #1-2
12-28-82	10900	N.M.	29.5	50.1	75.2	109.8	Bridgestone #1-2
12-28-82	10937	N.M.	36.4	62.2	94.3	135.7	Bridgestone #1-2
12-28-82	10951	N.M.	40.2	68.0	103.7	148.2	Bridgestone #1-2
12-30-82	10971	N.M.	48.1	79.5	114.9	160.2	Bridgestone #1-2
12-30-82	11007	N.M.	59.8	101.3	144.9	197.2	Bridgestone #1-2

Date	ODOM (km)	--Exhaust Gas Backpressure (in of water)-- 20 mph	30 mph	40 mph	50 mph	60 mph	Trap
01-10-83	11007	N.M.	11.3	20.1	32.3	45.0	Bridgestone BS2-1
01-11-83	11043	N.M.	11.2	20.9	33.9	50.7	Bridgestone BS2-1
01-11-83	11078	N.M.	14.8	26.7	38.7	58.0	Bridgestone BS2-1
01-12-83	11093	N.M.	13.5	23.8	38.4	57.1	Bridgestone BS2-1
01-13-83	11115	N.M.	14.6	25.7	40.5	62.9	Bridgestone BS2-1
01-13-82	11152	N.M.	16.8	27.6	45.1	68.6	Bridgestone BS2-1
01-19-82	11223	N.M.	20.2	35.9	54.2	80.7	Bridgestone BS2-1
01-19-82	11259	N.M.	22.2	38.7	58.7	86.9	Bridgestone BS2-1
01-19-82	11296	N.M.	24.1	42.4	63.5	95.0	Bridgestone BS2-1
01-20-83	11315	Regeneration at Steady State					
01-20-82	11348	N.M.	14.0	24.6	40.2	59.6	Bridgestone BS2-1
01-24-83	11363	N.M.	12.2	21.5	34.1	52.4	Bridgestone BS2-1
01-24-83	11883	N.M.	13.1	24.8	38.5	57.2	Bridgestone BS2-1
01-24-83	11419	N.M.	15.6	28.1	44.8	65.7	Bridgestone BS2-1
01-25-83	11434	N.M.	15.3	26.2	40.7	61.3	Bridgestone BS2-1
01-27-83	11453	N.M.	16.6	30.0	45.0	68.6	Bridgestone BS2-1
01-27-83	11505	N.M.	21.2	37.1	55.8	81.3	Bridgestone BS2-1
01-31-83	11521	N.M.	19.8	32.9	52.1	76.3	Bridgestone BS2-1
01-31-83	11541	N.M.	20.5	36.0	56.4	83.7	Bridgestone BS2-1
02-02-83	11556	N.M.	21.5	36.4	56.0	83.8	Bridgestone BS2-1
02-02-83	11571	N.M.	21.4	38.1	58.3	88.6	Bridgestone BS2-1
02-02-83	11586	N.M.	22.1	38.3	58.7	90.3	Bridgestone BS2-1
02-03-83	11600	Regeneration at Steady State					
02-03-83	11636	N.M.	13.0	23.9	38.2	56.5	Bridgestone BS2-1
02-03-83	11650	N.M.	11.0	21.5	34.0	49.0	Bridgestone BS2-1
02-04-83	11671	N.M.	11.7	21.9	36.4	54.7	Bridgestone BS2-1
02-02-83	11714	N.M.	14.9	26.9	40.5	61.6	Bridgestone BS2-1
02-07-83	11730	N.M.	14.8	25.4	40.3	62.9	Bridgestone BS2-1
02-10-83	11744	N.M.	14.0	25.4	40.8	62.2	Bridgestone BS2-1
02-11-83	11765	N.M.	15.7	28.0	43.8	67.6	Bridgestone BS2-1
02-11-83	11802	N.M.	19.3	33.3	50.5	76.8	Bridgestone BS2-1
02-15-83	11850	N.M.	22.0	38.7	56.6	84.2	Bridgestone BS2-1
02-16-83	11903	N.M.	22.7	39.5	59.2	89.5	Bridgestone BS2-1
03-01-83	11979	Regeneration at Steady State					
03-01-83	11994	N.M.	13.1	23.4	36.9	55.7	Bridgestone BS2-1
03-01-83	11979	N.M.	15.1	27.2	43.5	64.2	Bridgestone BS2-1
03-02-83	12015	N.M.	13.7	24.5	38.2	59.4	Bridgestone BS2-1
03-02-83	12052	N.M.	16.2	28.7	43.8	67.1	Bridgestone BS2-1
03-02-83	12069	N.M.	15.0	27.1	42.8	66.0	Bridgestone BS2-1
03-03-83	12087	N.M.	17.2	29.4	46.6	69.0	Bridgestone BS2-1
03-10-83	12121	N.M.	18.0	31.7	48.6	74.2	Bridgestone BS2-1
03-10-83	12158	N.M.	20.7	35.7	53.2	81.1	Bridgestone BS2-1
03-10-83	12195	N.M.	22.2	38.2	56.4	84.6	Bridgestone BS2-1
03-11-83	12213	N.M.	22.0	37.1	54.4	83.0	Bridgestone BS2-1
03-11-83	12233	N.M.	20.4	34.7	54.2	88.6	Bridgestone BS2-1
03-11-83	12247	N.M.	22.4	38.2	58.5	89.2	Bridgestone BS2-1
03-17-83	12282	N.M.	24.1	40.1	64.5	94.5	Bridgestone BS2-1
03-18-83	12303	N.M.	25.6	44.6	68.4	101.8	Bridgestone BS2-1
03-23-83	12334	N.M.	28.8	51.6	76.2	106.2	Bridgestone BS2-1
03-25-83	12356	N.M.	32.9	56.8	83.7	114.6	Bridgestone BS2-1
03-29-83	12439	N.M.	34.5	60.0	89.2	120.7	Bridgestone BS2-1
03-29-83	12405	Regeneration at Steady State					
03-29-83	12405	N.M.	20.4	39.2	57.9	77.3	Bridgestone BS2-1
03-29-83	12446	N.M.	18.6	34.0	49.1	69.3	Bridgestone BS2-1
03-30-83	12467	N.M.	20.5	40.0	58.5	81.2	Bridgestone BS2-1
03-30-83	12504	N.M.	25.0	45.9	67.2	93.2	Bridgestone BS2-1
03-30-83	12518	N.M.	25.9	46.0	67.6	93.4	Bridgestone BS2-1
03-31-83	12539	N.M.	27.18	50.5	72.0	99.7	Bridgestone BS2-1
03-31-83	12576	N.M.	29.7	53.0	79.2	107.6	Bridgestone BS2-1

Date	ODOM (km)	--Exhaust Gas Backpressure (in of water)-- 20 mph	30 mph	40 mph	50 mph	60 mph	Trap
04-04-83	12591	N.M.	10.4	19.0	23.6	32.9	Bridgestone Cat.
04-05-83	12612	N.M.	10.7	21.9	27.2	37.7	Bridgestone Cat.
04-05-83	12649	N.M.	11.2	23.5	30.1	41.6	Bridgestone Cat.
04-06-83	12664	N.M.	12.8	23.7	30.8	43.0	Bridgestone Cat.
04-07-83	12685	N.M.	14.0	27.4	37.5	51.5	Bridgestone Cat.
04-07-83	12723	N.M.	12.8	25.6	34.2	46.0	Bridgestone Cat.
04-08-83	12738	N.M.	13.8	25.3	33.7	47.8	Bridgestone Cat.
04-08-83	12753	N.M.	20.7	33.0	46.5	53.2	Bridgestone Cat.
04-08-83	12771	N.M.	22.9	37.5	52.9	58.2	Bridgestone Cat.
04-08-83	12788	N.M.	17.7	31.9	45.2	60.8	Bridgestone Cat.
04-08-83	12803	N.M.	18.0	33.0	47.6	63.5	Bridgestone Cat.
04-08-83	12817	N.M.	20.5	37.2	51.4	70.2	Bridgestone Cat.
04-11-83	12833	N.M.	19.0	34.3	48.2	67.6	Bridgestone Cat.
04-14-83	12847	N.M.	19.2	37.3	49.9	76.3	Bridgestone Cat.
04-15-83	12868	N.M.	20.3	38.1	55.9	76.3	Bridgestone Cat.
04-15-83	12904	N.M.	20.7	37.1	57.0	76.8	Bridgestone Cat.
04-21-83	13013	N.M.	19.2	38.0	56.1	77.1	Bridgestone Cat.
04-21-83	13049	N.M.	19.2	36.6	50.6	68.7	Bridgestone Cat.
04-18-83	12919	N.M.	18.6	33.7	50.8	69.4	Bridgestone Cat.
04-19-83	12940	N.M.	22.0	40.3	58.6	79.3	Bridgestone Cat.
04-19-83	12977	N.M.	20.2	37.7	52.3	68.0	Bridgestone Cat.
04-19-83	12992	N.M.	19.4	34.8	50.9	70.9	Bridgestone Cat.
04-25-83	13102	Regeneration at Steady State					
04-25-83	13102	N.M.	14.2	28.5	41.9	56.4	Bridgestone Cat.
04-25-83	13118	N.M.	12.8	27.0	36.9	53.6	Bridgestone Cat.
04-25-83	13133	N.M.	14.8	29.2	43.4	61.3	Bridgestone Cat.
04-25-83	13148	N.M.	16.3	32.4	46.0	66.0	Bridgestone Cat.
04-26-83	13163	N.M.	17.4	36.2	50.4	71.7	Bridgestone Cat.
04-26-83	13163	Regeneration at Steady State					
04-26-83	13197	N.M.	12.7	24.3	32.7	46.3	Bridgestone Cat.
04-26-83	13212	N.M.	11.2	23.7	29.4	42.1	Bridgestone Cat.
04-27-83	13233	N.M.	13.2	26.9	36.4	51.9	Bridgestone Cat.
04-27-83	13270	N.M.	15.2	29.4	42.6	59.0	Bridgestone Cat.
04-27-83	13284	N.M.	15.6	32.4	43.8	61.4	Bridgestone Cat.
04-28-83	13305	N.M.	18.1	33.2	51.6	69.9	Bridgestone Cat.
04-28-83	13343	N.M.	18.2	34.5	51.4	70.3	Bridgestone Cat.
04-28-83	13343	Regeneration at Steady State					
04-28-83	13387	N.M.	9.5	22.3	29.4	40.2	Bridgestone Cat.
04-28-83	13401	N.M.	10.3	21.6	26.7	37.5	Bridgestone Cat.
04-29-83	13422	N.M.	11.3	25.3	32.0	46.3	Bridgestone Cat.
04-29-83	13460	N.M.	14.0	27.3	38.5	53.4	Bridgestone Cat.
05-02-83	13485	N.M.	9.3	18.0	22.7	32.2	Bridgestone Cat. #2
05-04-83	13506	N.M.	9.2	21.3	27.6	38.6	Bridgestone Cat. #2
05-04-83	13544	N.M.	10.1	22.3	29.5	40.1	Bridgestone Cat. #2
05-04-83	13559	N.M.	10.5	20.8	27.3	38.3	Bridgestone Cat. #2
05-05-83	13581	N.M.	11.2	23.7	31.8	45.4	Bridgestone Cat. #2
05-05-83	13618	N.M.	12.2	25.3	35.1	48.5	Bridgestone Cat. #2
05-05-83	13633	N.M.	14.8	29.0	37.2	52.7	Bridgestone Cat. #2
05-05-83	13650	N.M.	13.0	25.8	37.6	52.4	Bridgestone Cat. #2
05-05-83	13664	N.M.	14.0	26.8	40.0	55.0	Bridgestone Cat. #2
05-06-83	13679	N.M.	15.3	27.8	40.9	55.4	Bridgestone Cat. #2
05-06-83	13693	N.M.	15.3	30.3	44.6	58.4	Bridgestone Cat. #2
05-06-83	13708	N.M.	17.8	32.3	47.0	63.2	Bridgestone Cat. #2
05-06-83	13724	N.M.	16.0	30.1	44.4	62.6	Bridgestone Cat. #2
05-09-83	13739	N.M.	14.5	28.2	39.8	55.3	Bridgestone Cat. #2
05-09-83	13754	N.M.	15.3	29.9	43.0	59.7	Bridgestone Cat. #2
05-09-83	13770	N.M.	16.6	32.0	46.2	65.0	Bridgestone Cat. #2

	ODOM	--Exhaust Gas Backpressure (in of water)--					
Date	(km)	20 mph	30 mph	40 mph	50 mph	60 mph	Trap
05-11-83	13845	N.M.	17.6	34.2	47.6	65.4	Bridgestone Cat. #2
05-11-83	13792	N.M.	18.6	35.4	53.0	72.6	Bridgestone Cat. #2
05-11-83	13830	N.M.	18.4	35.3	50.1	67.9	Bridgestone Cat. #2
05-12-83	13865	N.M.	18.0	36.3	52.3	72.3	Bridgestone Cat. #2
05-12-83	13902	N.M.	19.5	38.2	56.0	76.9	Bridgestone Cat. #2
05-17-83	13950	Regeneration at Steady State					
05-17-83	13950	N.M.	9.5	21.5	26.5	38.4	Bridgestone Cat. #2
05-17-83	13966	N.M.	9.0	20.2	23.5	34.7	Bridgestone Cat. #2
05-18-83	13987	N.M.	9.7	23.2	28.4	41.3	Bridgestone Cat. #2
05-18-83	14003	N.M.	10.8	22.6	29.8	44.3	Bridgestone Cat. #2
05-19-83	14025	N.M.	10.97	27.76	33.28	48.0	Bridgestone Cat. #2
05-19-83	14060	N.M.	13.3	30.7	40.13	53.7	Bridgestone Cat. #2
05-19-83	14097	N.M.	15.1	30.3	42.3	58.3	Bridgestone Cat. #2
05-23-83	14114	N.M.	16.2	31.3	42.6	60.5	Bridgestone Cat. #2
05-23-83	14128	N.M.	16.4	33.1	44.0	60.2	Bridgestone Cat. #2
05-23-83	14144	N.M.	17.6	33.6	46.9	66.8	Bridgestone Cat. #2
05-25-83	14167	N.M.	18.9	37.2	53.3	75.3	Bridgestone Cat. #2
05-25-83	14208	N.M.	18.2	35.3	51.9	72.2	Bridgestone Cat. #2
05-25-83	14223	N.M.	18.6	36.2	52.1	75.2	Bridgestone Cat. #2
05-31-83	14287	N.M.	20.6	39.8	59.9	81.8	Bridgestone Cat. #2
06-01-83	14308	N.M.	23.2	43.7	67.1	91.4	Bridgestone Cat. #2
06-01-83	14345	N.M.	23.5	41.8	63.3	84.0	Bridgestone Cat. #2
06-02-83	14387	Regeneration at Steady State					
06-02-83	14394	N.M.	8.9	20.5	28.0	38.2	Bridgestone Cat. #2
06-02-83	14410	N.M.	8.6	21.6	25.3	36.7	Bridgestone Cat. #2
06-03-83	14433	N.M.	10.0	21.7	28.4	41.0	Bridgestone Cat. #2
06-03-83	14470	N.M.	12.8	24.8	33.5	46.8	Bridgestone Cat. #2
06-03-83	14497	N.M.	14.5	26.9	37.5	51.4	Bridgestone Cat. #2
06-03-83	14521	N.M.	15.6	28.5	40.6	55.1	Bridgestone Cat. #2
06-03-83	14548	N.M.	16.9	30.2	43.1	62.1	Bridgestone Cat. #2
06-06-83	14565	N.M.	16.6	29.8	41.7	59.5	Bridgestone Cat. #2
06-07-83	14587	N.M.	18.5	34.4	50.2	68.6	Bridgestone Cat. #2
06-07-83	14624	N.M.	21.2	37.0	54.5	72.6	Bridgestone Cat. #2
06-07-83	14624	Regeneration at Steady State					
06-07-83	14660	N.M.	10.0	21.5	28.8	38.5	Bridgestone Cat. #2
06-07-83	14676	N.M.	10.3	19.3	25.5	35.3	Bridgestone Cat. #2
06-08-83	14698	N.M.	10.9	23.1	30.8	41.4	Bridgestone Cat. #2
06-08-83	14738	N.M.	13.2	25.5	34.8	47.0	Bridgestone Cat. #2
06-08-83	14752	N.M.	13.2	25.9	35.9	49.6	Bridgestone Cat. #2
06-10-83	14774	N.M.	16.7	30.4	43.0	58.8	Bridgestone Cat. #2
06-10-83	14809	N.M.	19.9	35.5	51.6	69.0	Bridgestone Cat. #2
06-13-83	14825	N.M.	17.3	31.7	47.0	67.1	Bridgestone Cat. #2
06-14-83	14847	N.M.	20.9	36.9	55.9	78.6	Bridgestone Cat. #2
06-14-83	14883	N.M.	27.4	45.0	64.5	84.9	Bridgestone Cat. #2
06-14-83	14898	N.M.	25.5	41.3	59.4	80.1	Bridgestone Cat. #2
06-15-83	14920	N.M.	27.8	46.7	70.6	97.9	Bridgestone Cat. #2
06-15-83	14957	N.M.	28.4	46.9	69.1	94.4	Bridgestone Cat. #2
06-15-83	14957	Regeneration at Steady State					
06-15-83	14999	N.M.	14.8	25.3	30.6	39.5	Bridgestone Cat. #2
06-15-83	15013	N.M.	12.6	23.6	29.1	38.5	Bridgestone Cat. #2
06-16-83	15034	N.M.	10.8	21.2	29.4	40.6	Bridgestone Cat. #2
06-16-83	15070	N.M.	13.5	25.1	36.1	49.0	Bridgestone Cat. #2

Appendix C-4

Exhaust Backpressure Data on VW Rabbit

VEHICLE I.D. 071-812 (1982 VW DIESEL RABBIT)

Date	ODOM (mi)	--Exhaust Gas Backpressure (in of water)--					Trap
		20 mph	30 mph	40 mph	50 mph	60 mph	
07-02-82	6264	N.M.	38.2	59.3	82.1	110.2	Johnson Matthey JM-13
07-07-82	6287	N.M.	39.7	59.5	81.2	105.6	Johnson Matthey JM-13
07-07-82	6296	N.M.	37.2	58.1	83.5	110.7	Johnson Matthey JM-13
07-07-82	6318	N.M.	41.2	62.9	87.2	113.7	Johnson Matthey JM-13
07-07-82	6327	N.M.	41.9	64.1	88.7	123.7	Johnson Matthey JM-13
07-20-82	6460	N.M.	50.8	73.2	102.8	137.5	Johnson Matthey JM-13
07-21-82	6473	N.M.	60.2	86.7	117.6	154.1	Johnson Matthey JM-13
07-21-82	6496	N.M.	59.6	81.5	109.6	145.9	Johnson Matthey JM-13
07-21-82	6505	N.M.	51.9	79.5	110.7	161.	Johnson Matthey JM-13
07-22-82	6519	N.M.	71.4	102.5	138.2	177.7	Johnson Matthey JM-13
07-22-82	6529	N.M.	75.4	103.6	137.4	177.5	Johnson Matthey JM-13
07-22-82	6562	N.M.	55.7	79.6	107.5	142.5	Johnson Matthey JM-13
07-22-82	6571	N.M.	57.4	88.7	118.5	157.8	Johnson Matthey JM-13
07-23-82	6571	Regeneration at Steady State					
07-23-82	6580	N.M.	22.7	35.5	51.5	69.1	Johnson Matthey JM-13
07-26-82	6591	N.M.	24.01	37.19	54.40	77.08	Johnson Matthey JM-13
07-27-82	6604	N.M.	27.9	44.6	61.6	83.7	Johnson Matthey JM-13
07-27-82	6626	N.M.	32.4	49.2	66.7	89.5	Johnson Matthey JM-13
07-27-82	6635	N.M.	31.5	49.2	67.6	92.5	Johnson Matthey JM-13
07-28-82	6648	N.M.	38.8	56.2	78.7	108.4	Johnson Matthey JM-13
07-28-82	6671	N.M.	39.2	58.9	80.8	109.3	Johnson Matthey JM-13
07-28-82	6680	N.M.	44.5	65.9	89.4	116.4	Johnson Matthey JM-13
08-02-82	6700	N.M.	86.6	123.5	167.9	200.0	Johnson Matthey JM-13
08-03-82	6715	Regeneration at Steady State					
08-03-82	6715	N.M.	N.M.	54.7	75.1	91.1	Johnson Matthey JM-13
08-03-82	6724	N.M.	32.8	50.8	70.2	98.4	Johnson Matthey JM-13
08-04-82	6736	N.M.	40.5	60.7	85.5	115.3	Johnson Matthey JM-13
08-04-82	6758	N.M.	37.7	51.6	81.5	106.5	Johnson Matthey JM-13
08-04-82	6767	N.M.	39.5	60.2	84.2	118.5	Johnson Matthey JM-13
08-09-82	6777.7	N.M.	47.1	67.9	97.5	128.4	Johnson Matthey JM-13
08-11-82	6786	N.M.	52.6	76.5	105.7	139.7	Johnson Matthey JM-13
08-12-82	6799	N.M.	60.4	88.9	121.3	158.7	Johnson Matthey JM-13
08-12-82	6821	N.M.	58.2	84.5	112.9	147.2	Johnson Matthey JM-13
08-12-82	6830	N.M.	60.4	85.6	116.7	154.5	Johnson Matthey JM-13
08-13-82	6849	Regeneration at Steady State					
08-13-82	6849	N.M.	29.2	44.3	60.0	79.7	Johnson Matthey JM-13
08-16-82	6858	N.M.	18.01	26.4	37.8	56.08	Johnson Matthey JM-13
08-17-82	6872	N.M.	41.7	60.2	83.5	108.4	Johnson Matthey JM-13
08-17-82	6887	N.M.	44.6	64.0	87.8	117.6	Johnson Matthey JM-13
08-17-82	6901	N.M.	51.2	72.1	100.9	127.9	Johnson Matthey JM-13
08-17-82	6916	N.M.	55.7	79.5	104.5	134.4	Johnson Matthey JM-13
08-17-82	6931	N.M.	57.8	84.5	112.9	145.9	Johnson Matthey JM-13
08-17-82	6953	N.M.	54.7	78.2	107.6	139.2	Johnson Matthey JM-13
08-17-82	6961	N.M.	52.7	78.5	109.6	144.8	Johnson Matthey JM-13
08-18-82	6974	N.M.	71.6	101.5	13.6	178.5	Johnson Matthey JM-13
08-19-82	6999	Regeneration at Steady State (Unsuccessful)					
08-20-82	7016	Regeneration at Steady State					
08-20-82	7016	N.M.	23.5	36.8	51.4	66.5	Johnson Matthey JM-13
08-23-82	7025	N.M.	26.8	40.9	59.1	81.2	Johnson Matthey JM-13
08-24-82	7037	N.M.	34.7	53.5	73.0	99.4	Johnson Matthey JM-13
08-24-82	7059	N.M.	38.8	57.0	77.8	103.9	Johnson Matthey JM-13
08-24-82	7068	N.M.	37.8	55.7	79.3	108.7	Johnson Matthey JM-13
08-25-82	7082	N.M.	46.5	70.2	99.4	135.6	Johnson Matthey JM-13
08-25-82	7104	N.M.	52.0	76.6	106.4	137.4	Johnson Matthey JM-13
08-25-82	7113	N.M.	51.9	75.8	106.6	141.5	Johnson Matthey JM-13
08-26-82	7126	Regeneration at Steady State					
08-26-82	7126	N.M.	27.5	41.9	61.2	75.2	Johnson Matthey JM-13
08-26-82	7135	N.M.	30.9	46.9	64.8	87.2	Johnson Matthey JM-13
08-27-82	7148	N.M.	37.9	56.9	77.5	105.1	Johnson Matthey JM-13
08-27-82	7169	N.M.	42.7	65.4	88.2	118.5	Johnson Matthey JM-13
08-27-82	7178	N.M.	47.8	70.2	95.8	126.6	Johnson Matthey JM-13
08-31-82	7198	N.M.	52.7	73.9	100.5	138.8	Johnson Matthey JM-13
08-31-82	7198	Regeneration at Steady State					
09-01-82	7239	N.M.	31.9	49.8	70.5	91.9	Johnson Matthey JM-13
09-01-82	7247	N.M.	31.9	46.4	64.9	90.6	Johnson Matthey JM-13
09-03-82	7273	N.M.	42.4	63.2	85.7	112.6	Johnson Matthey JM-13
09-03-82	7282	N.M.	43.7	65.4	88.0	118.7	Johnson Matthey JM-13

	ODOM	--Exhaust Gas Backpressure (in of water)--					
Date	(mi)	20 mph	30 mph	40 mph	50 mph	60 mph	Trap
09-08-82	7303	N.M.	58.9	84.5	113.7	155.4	Johnson Matthey JM-13
09-08-82	7325	N.M.	56.6	82.3	111.6	150.1	Johnson Matthey JM-13
09-08-82	7334	N.M.	60.3	87.6	120.9	169.5	Johnson Matthey JM-13
09-09-82	7337	Regeneration at Steady State					
09-09-82	7337	N.M.	44.7	65.0	91.7	118.7	Johnson Matthey JM-13
09-10-82	7357	Regeneration at Steady State					
09-10-82	7392	N.M.	22.5	34.8	50.7	65.6	Johnson Matthey JM-13
09-10-82	7408	N.M.	22.6	36.6	54.5	80.0	Johnson Matthey JM-13
09-10-82	7416	N.M.	28.6	44.3	62.6	87.9	Johnson Matthey JM-13
09-10-82	7423	N.M.	31.3	49.1	71.0	97.3	Johnson Matthey JM-13
09-10-82	7430	N.M.	36.8	55.8	79.8	108.5	Johnson Matthey JM-13
09-10-82	7438	N.M.	41.8	63.2	87.8	117.8	Johnson Matthey JM-13
09-14-82	7462	N.M.	24.3	36.8	51.5	65.6	Johnson Matthey JM-13
09-15-82	7472	N.M.	27.8	42.5	60.4	83.2	Johnson Matthey JM-13
09-20-82	7487	N.M.	33.5	42.0	70.5	96.4	Johnson Matthey JM-13
09-21-82	7495	N.M.	37.1	56.2	77.4	104.7	Johnson Matthey JM-13
09-21-82	7517	N.M.	37.8	55.1	76.1	104.6	Johnson Matthey JM-13
09-21-82	7526	N.M.	40.9	60.7	86.7	117.6	Johnson Matthey JM-13
09-22-82	7548	N.M.	46.5	68.2	93.4	127.7	Johnson Matthey JM-13
09-22-82	7558	N.M.	48.9	73.2	100.8	130.2	Johnson Matthey JM-13
09-24-82	7571	N.M.	58.5	86.8	118.2	158.8	Johnson Matthey JM-13
09-27-82	7587	Regeneration at Steady State					
09-28-82	7587	N.M.	28.5	44.1	63.3	79.2	Johnson Matthey JM-13
09-28-82	7596	N.M.	29.5	46.9	67.2	92.6	Johnson Matthey JM-13
09-29-82	7609	N.M.	42.9	65.4	89.0	120.0	Johnson Matthey JM-13
09-29-82	7632	N.M.	44.0	65.7	89.2	118.7	Johnson Matthey JM-13
09-29-82	7641	N.M.	45.3	69.5	98.3	133.5	Johnson Matthey JM-13
09-30-82	7654	N.M.	56.9	83.1	114.9	154.2	Johnson Matthey JM-13
09-30-82	7676	N.M.	54.7	81.2	111.7	158.6	Johnson Matthey JM-13
09-30-82	7685	N.M.	60.9	86.5	119.2	146.5	Johnson Matthey JM-13
10-05-82	7710	Regeneration at Steady State					
10-05-82	7710	N.M.	27.9	42.5	63.4	85.2	Johnson Matthey JM-13
10-07-82	7723	N.M.	40.4	60.6	84.2	113.4	Johnson Matthey JM-13
10-07-82	7745	N.M.	43.2	63.9	88.5	116.5	Johnson Matthey JM-13
10-07-82	7754	N.M.	44.0	66.2	92.7	128.4	Johnson Matthey JM-13
10-08-82	7777	N.M.	52.2	75.6	101.9	135.8	Johnson Matthey JM-13
10-08-82	7786	N.M.	53.7	77.7	108.6	147.6	Johnson Matthey JM-13
10-13-82	7798	N.M.	69.2	98.1	134.5	174.6	Johnson Matthey JM-13
10-14-82	7811	N.M.	80.2	115.2	154.5	197.6	Johnson Matthey JM-13
10-14-82	7811	Regeneration at Steady State					
10-14-82	7823	N.M.	26.4	40.5	56.2	71.2	Johnson Matthey JM-13
10-14-82	7832	N.M.	30.9	46.6	65.7	87.7	Johnson Matthey JM-13
N.R.	7846	N.M.	38.2	56.7	77.8	103.5	Johnson Matthey JM-13
N.R.	7868	N.M.	43.0	64.1	87.1	111.6	Johnson Matthey JM-13
N.R.	7878	N.M.	46.8	68.1	93.9	121.5	Johnson Matthey JM-13
10-18-82	7887	N.M.	49.2	73.4	103.9	147.1	Johnson Matthey JM-13
10-20-82	7900	N.M.	65.9	94.0	126.8	160.4	Johnson Matthey JM-13
10-20-82	7923	N.M.	58.5	87.6	115.2	152.4	Johnson Matthey JM-13
10-20-82	7932	N.M.	60.5	87.0	125.4	163.7	Johnson Matthey JM-13
10-26-82	7938	Regeneration at Steady State					
10-26-82	7943	N.M.	41.4	63.1	89.3	124.2	Johnson Matthey JM-13
10-26-82	7949	N.M.	39.5	60.6	82.6	107.9	Johnson Matthey JM-13
10-27-82	7972	N.M.	54.6	80.7	113.2	150.6	Johnson Matthey JM-13
10-27-82	7994	N.M.	54.6	82.6	133.6	148.2	Johnson Matthey JM-13
10-27-82	8003	N.M.	56.6	86.5	119.1	158.4	Johnson Matthey JM-13
11-02-82	8020	Regeneration at Steady State					

Date	ODOM (mi)	--Exhaust Gas Backpressure (in of water)--					Trap
		20 mph	30 mph	40 mph	50 mph	60 mph	
11-02-82	8020	N.M.	23.5	36.9	51.2	65.8	Johnson Matthey JM-13
11-02-82	8029	N.M.	25.8	40.7	57.7	77.9	Johnson Matthey JM-13
11-03-82	8042	N.M.	33.7	51.8	72.5	94.6	Johnson Matthey JM-13
11-03-82	8064	N.M.	40.5	59.7	82.4	108.9	Johnson Matthey JM-13
11-03-82	8073	N.M.	43.0	63.7	87.8	120.5	Johnson Matthey JM-13
11-05-82	8086	N.M.	51.9	76.0	105.6	140.5	Johnson Matthey JM-13
11-05-82	8108	N.M.	55.7	79.7	107.2	136.9	Johnson Matthey JM-13
N.R.	8129	N.M.	53.1	77.9	107.1	139.2	Johnson Matthey JM-13
11-17-82	8129	Regeneration at Steady State					
11-17-82	8154	N.M.	22.5	35.5	50.5	64.8	Johnson Matthey JM-13
11-17-82	8163	N.M.	30.3	46.9	63.0	87.8	Johnson Matthey JM-13
11-18-82	8176	N.M.	37.8	55.3	77.1	106.7	Johnson Matthey JM-13
11-18-82	8207	N.M.	40.2	59.5	81.6	110.9	Johnson Matthey JM-13
11-18-82	8198	N.M.	42.0	62.8	87.0	119.2	Johnson Matthey JM-13
11-19-82	8219	N.M.	56.3	79.6	110.5	147.8	Johnson Matthey JM-13
11-19-82	8241	N.M.	54.7	76.2	103.7	139.3	Johnson Matthey JM-13
11-24-82	8250	N.M.	56.8	84.4	115.4	150.5	Johnson Matthey JM-13
11-24-82	8250	Regeneration at Steady State					
11-24-82	8261	N.M.	25.2	39.8	55.5	69.5	Johnson Matthey JM-13
11-29-82	8271	N.M.	28.2	45.0	64.3	85.5	Johnson Matthey JM-13
11-30-82	8283	N.M.	37.6	57.3	79.2	105.8	Johnson Matthey JM-13
11-30-82	8305	N.M.	41.2	60.3	83.7	112.5	Johnson Matthey JM-13
11-30-82	8333	N.M.	50.6	75.5	100.3	133.6	Johnson Matthey JM-13
12-01-82	8405	Regeneration at Steady State					
12-01-82	8425	N.M.	26.7	41.5	57.4	72.5	Johnson Matthey JM-13
12-06-82	8435	N.M.	30.6	47.5	70.2	92.7	Johnson Matthey JM-13
12-07-82	8457	N.M.	35.2	52.8	73.9	105.2	Johnson Matthey JM-13
12-07-82	8466	N.M.	36.7	56.2	78.8	114.8	Johnson Matthey JM-13
12-08-82	8478	N.M.	51.3	79.5	107.9	141.9	Johnson Matthey JM-13
12-08-82	8500	N.M.	52.5	79.6	107.8	141.2	Johnson Matthey JM-13
12-13-82	8508	N.M.	57.9	85.3	115.0	143.7	Johnson Matthey JM-13
12-13-82	8517	N.M.	78.8	111.7	147.2	174.3	Johnson Matthey JM-13
12-15-82	8530	N.M.	71.2	101.7	131.5	181.2	Johnson Matthey JM-13
12-15-82	8530	Regeneration at Steady State					
12-15-82	8547	N.M.	35.7	52.2	71.3	90.8	Johnson Matthey JM-13
12-15-82	8556	N.M.	40.5	59.2	80.9	103.7	Johnson Matthey JM-13
12-16-82	8569	N.M.	50.3	75.6	102.5	134.5	Johnson Matthey JM-13
12-16-82	8590	N.M.	52.8	77.6	105.2	137.3	Johnson Matthey JM-13
12-16-82	8598	N.M.	52.8	78.6	110.7	149.2	Johnson Matthey JM-13
12-20-82	8607	N.M.	65.8	93.8	127.0	157.8	Johnson Matthey JM-13
12-20-82	8619	N.M.	83.8	117.8	156.4	195.2	Johnson Matthey JM-13
12-20-82	8641	N.M.	70.3	102.8	137.2	173.5	Johnson Matthey JM-13
12-28-82	8680	Regeneration at Steady State					
12-28-82	8680	N.M.	27.0	41.6	57.5	71.8	Johnson Matthey JM-13
12-28-82	8689	N.M.	28.6	46.2	65.7	88.4	Johnson Matthey JM-13
12-29-82	8702	N.M.	41.6	61.4	85.6	114.7	Johnson Matthey JM-13
12-29-82	8724	N.M.	45.9	66.6	91.3	126.7	Johnson Matthey JM-13
12-29-82	8733	N.M.	55.8	81.5	108.4	130.2	Johnson Matthey JM-13
12-30-82	8745	N.M.	61.8	92.3	124.7	160.5	Johnson Matthey JM-13
12-30-82	8768	N.M.	62.8	91.4	123.5	158.2	Johnson Matthey JM-13
12-30-82	8779	Regeneration at Steady State					
12-30-82	8799	N.M.	34.5	52.3	72.3	89.7	Johnson Matthey JM-13
01-04-83	8779	Regeneration at Steady State					
01-14-82	8935	N.M.	40.8	62.0	90.6	122.7	Johnson Matthey JM-13
01-14-82	8944	N.M.	44.9	73.0	104.5	137.4	Johnson Matthey JM-13
01-14-82	8953	N.M.	53.5	80.7	110.2	146.7	Johnson Matthey JM-13
01-14-82	8961	N.M.	52.3	81.2	116.6	162.5	Johnson Matthey JM-13
01-14-82	8970	N.M.	68.8	103.7	142.7	184.7	Johnson Matthey JM-13
01-14-82	8979	N.M.	78.8	113.6	152.7	205.7	Johnson Matthey JM-13
01-18-83	8980	Regeneration at Steady State					
01-18-82	8999	N.M.	35.0	52.8	74.2	94.5	Johnson Matthey JM-13

Appendix D

Graphs of Fuel Economy, Trapping Efficiency, and Exhaust Backpressure
versus
Mileage Accumulation

FIGURE D-1: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
MERCEDES CAR EQUIPPED WITH TEXACO A-1R TRAP
EGBP @ 60 MPH

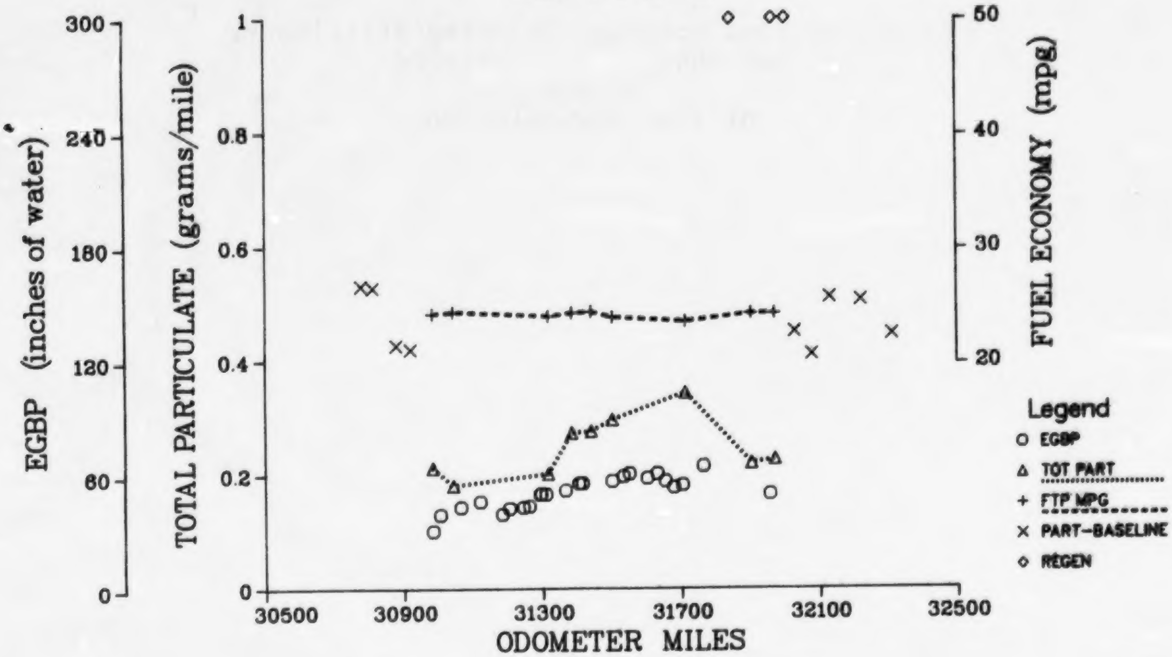


FIGURE D-2: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
MERCEDES CAR EQUIPPED WITH TEXACO A-1R, ENGELHARD CST-1 COATING
EGBP @ 60 MPH

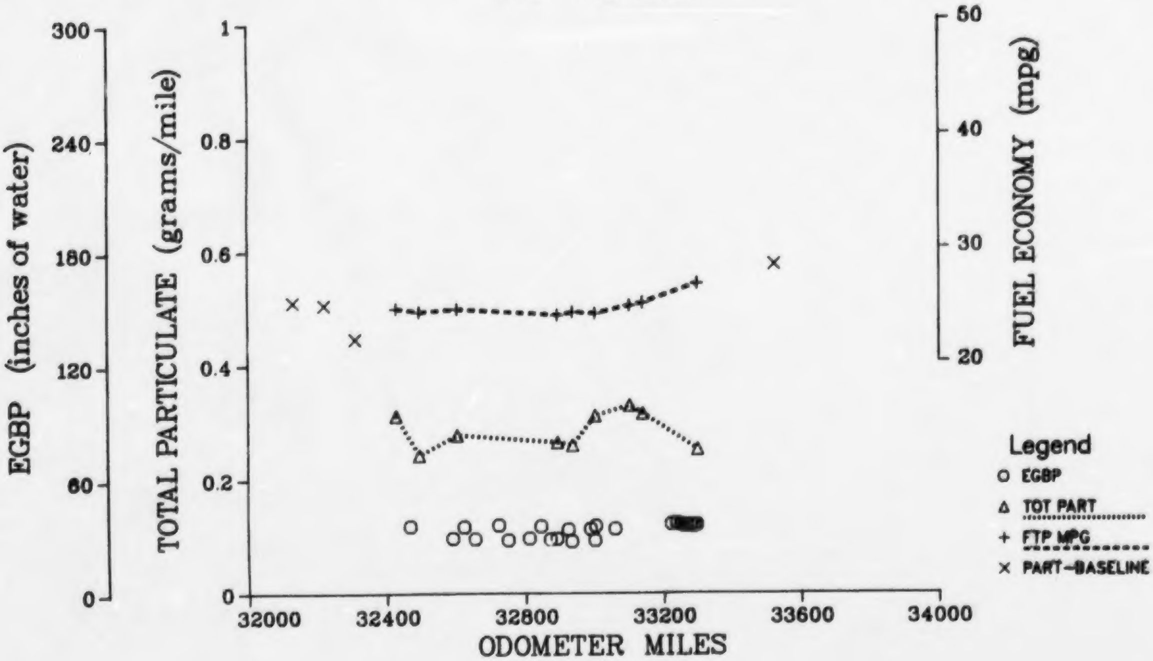


FIGURE D-3: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
MERCEDES CAR EQUIPPED WITH ENGELHARD CST-1 COATING #2
EGBP @ 60 MPH

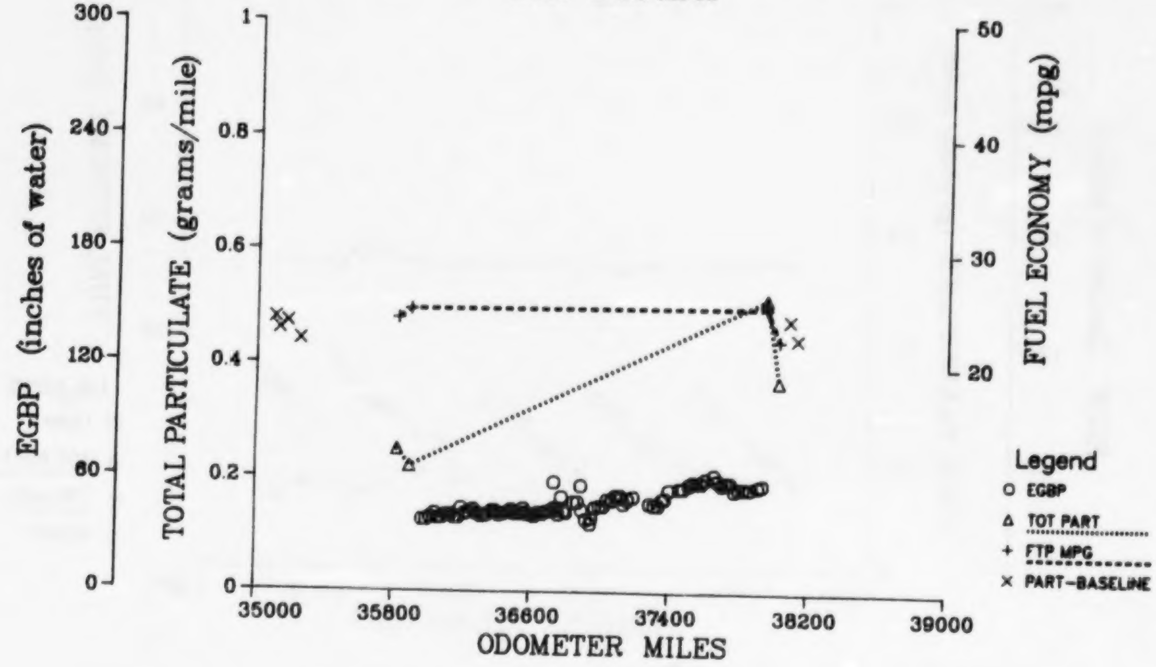


FIGURE D-4: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
TOYOTA CAR EQUIPPED WITH BRIDGESTONE #1-2
EGBP @ 60 MPH

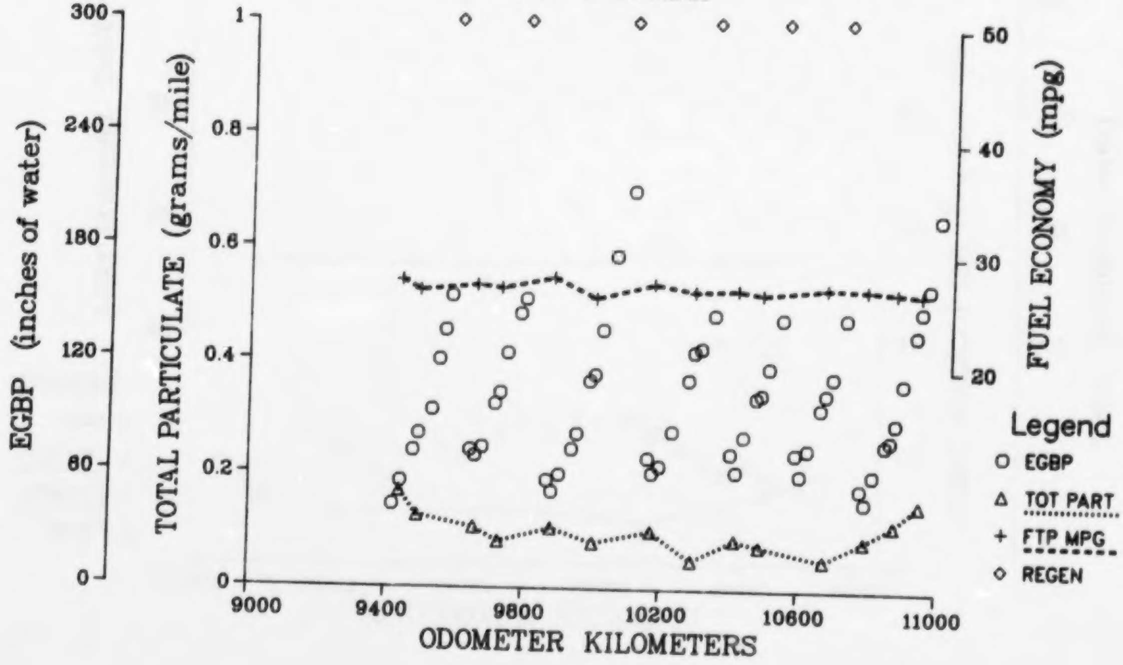


FIGURE D-5: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
TOYOTA CAR EQUIPPED WITH BRIDGESTONE BS2-1
EGBP @ 60 MPH

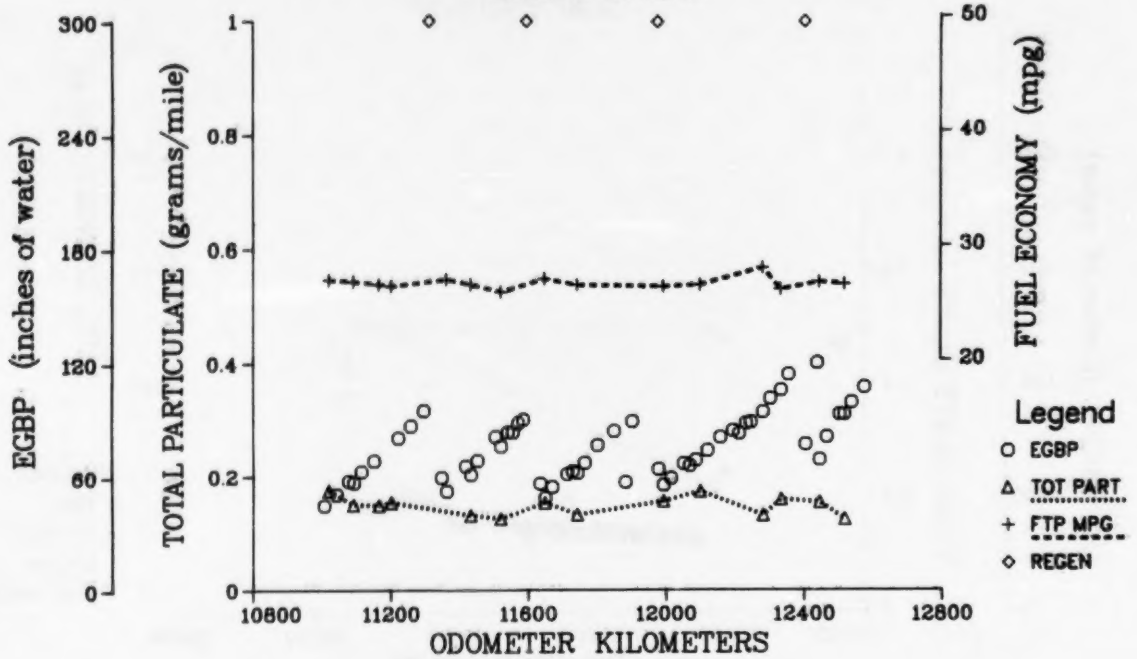


FIGURE D-6: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
TOYOTA CAR EQUIPPED WITH BRIDGESTONE CATALYZED TRAP
EGBP @ 60 MPH

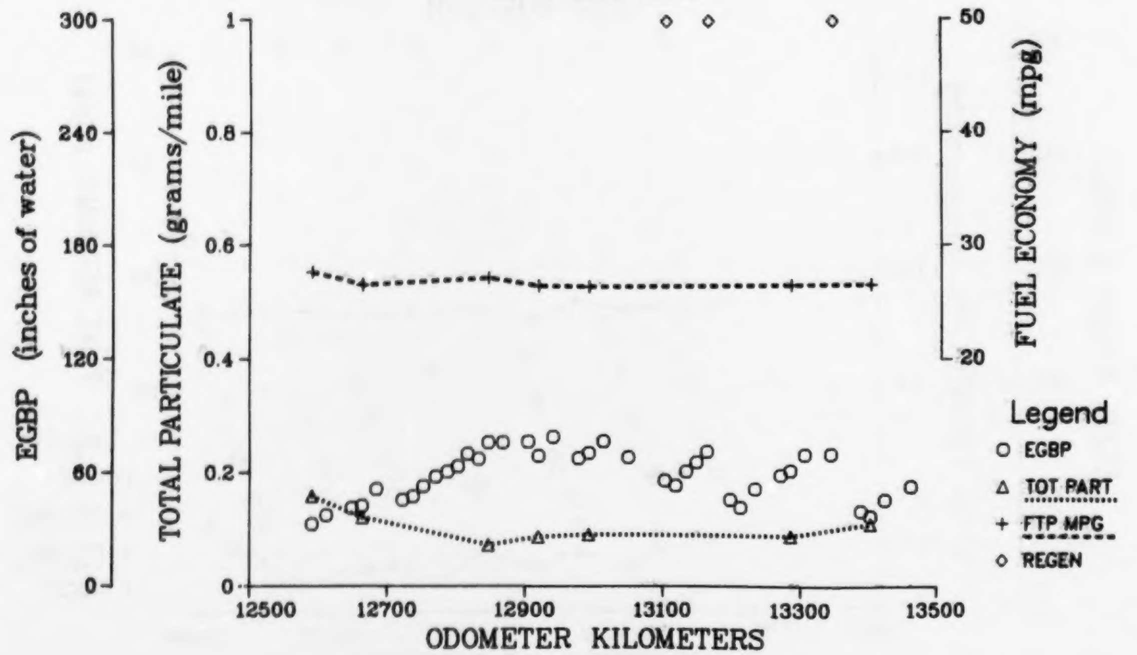


FIGURE D-7: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
TOYOTA CAR EQUIPPED WITH BRIDGESTONE CAT #2
EGBP @ 60 MPH

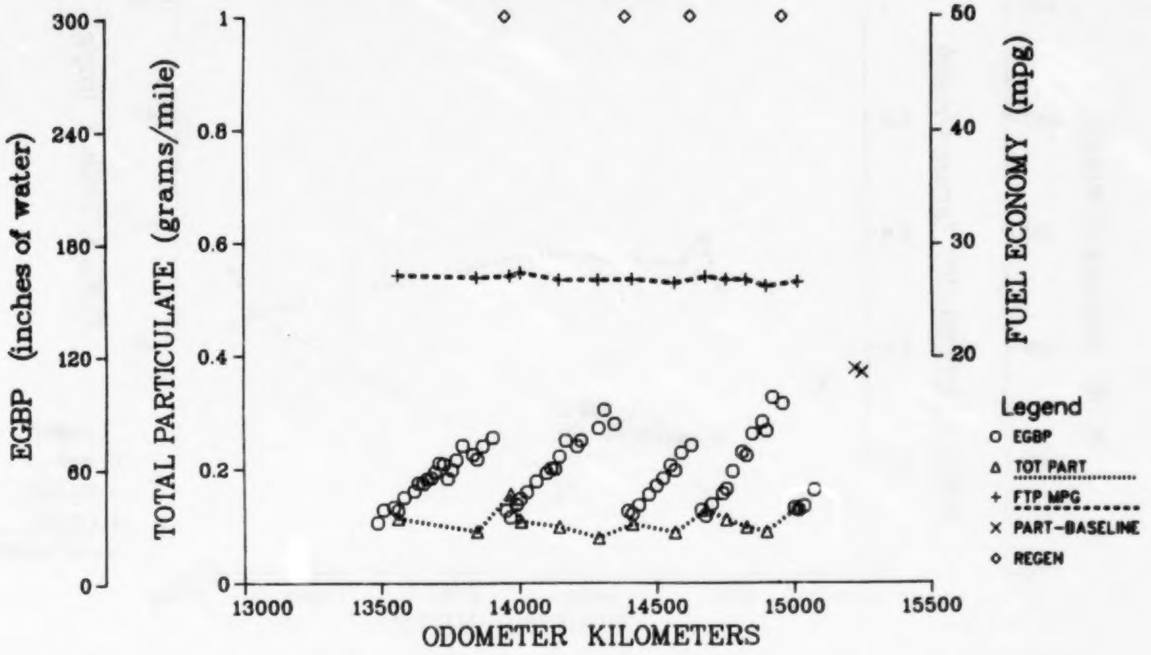


FIGURE D-8: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
PEUGEOT CAR EQUIPPED WITH JOHNSON MATTHEY JM-4 #1 TRAP
EGBP @ 60 MPH

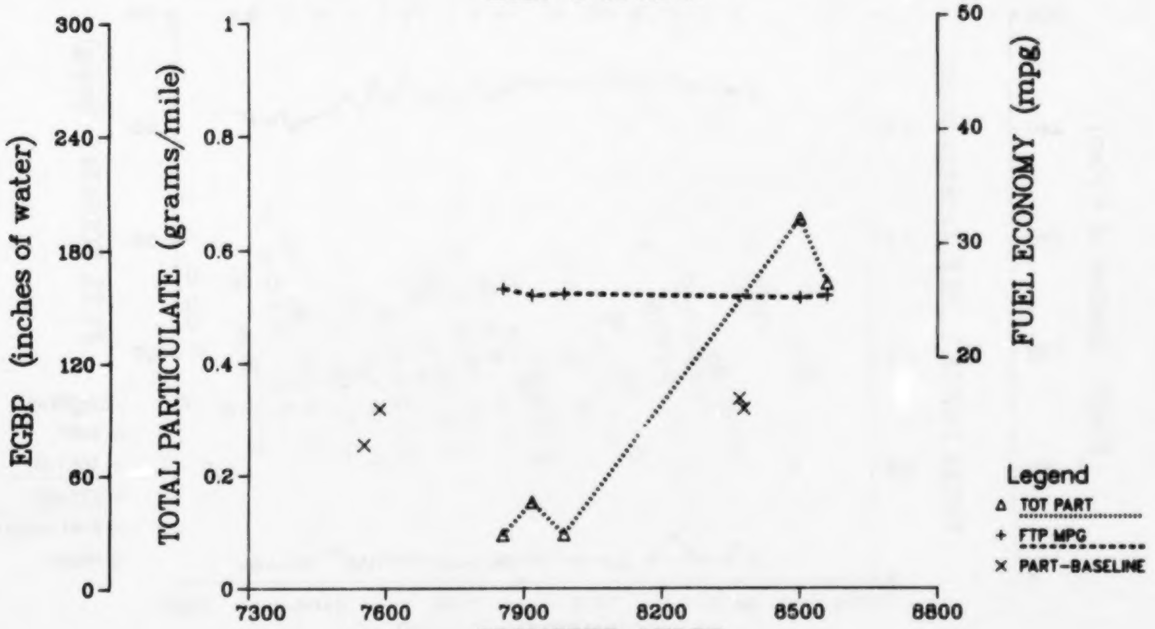


FIGURE D-9: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
PEUGEOT CAR EQUIPPED WITH JOHNSON MATTHEY JM-4 #2 TRAP
EGBP @ 60 MPH

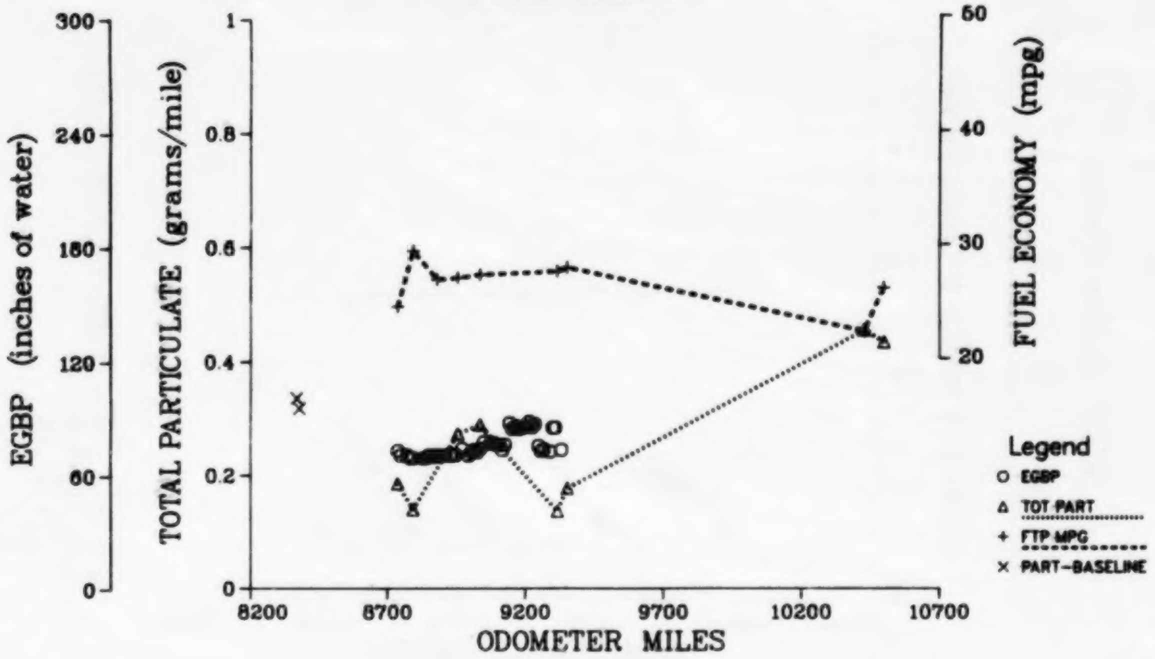


FIGURE D-10: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
VW CAR EQUIPPED WITH JOHNSON MATTHEY JM-13
EGBP @ 60 MPH

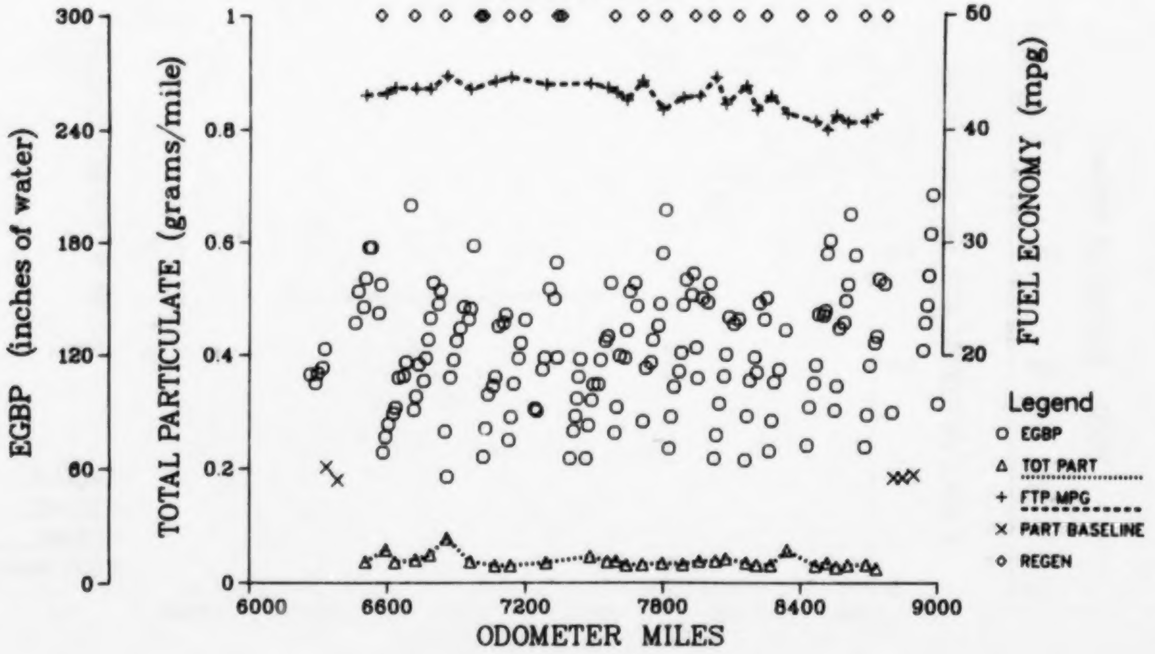


FIGURE D-11: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
MERCEDES CAR EQUIPPED WITH ICI SAFFIL
EGBP @ 60 MPH

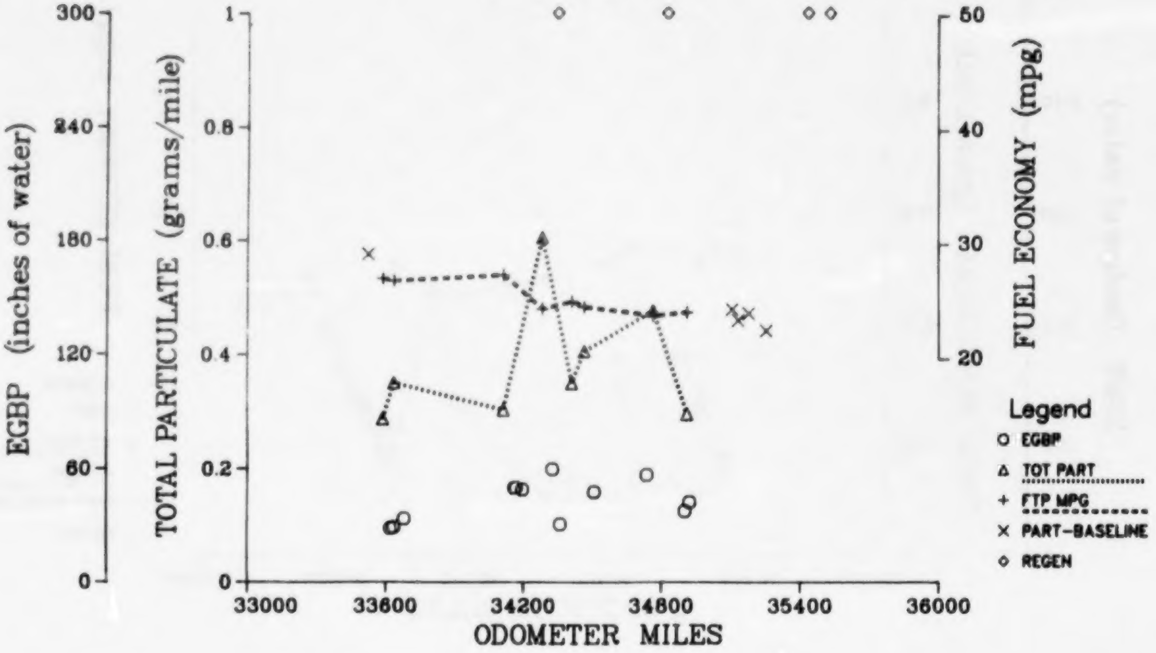


FIGURE D-12: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
TOYOTA CAR EQUIPPED WITH ICI SAFFIL, GENERATION #4 TRAP
EGBP @ 60 MPH

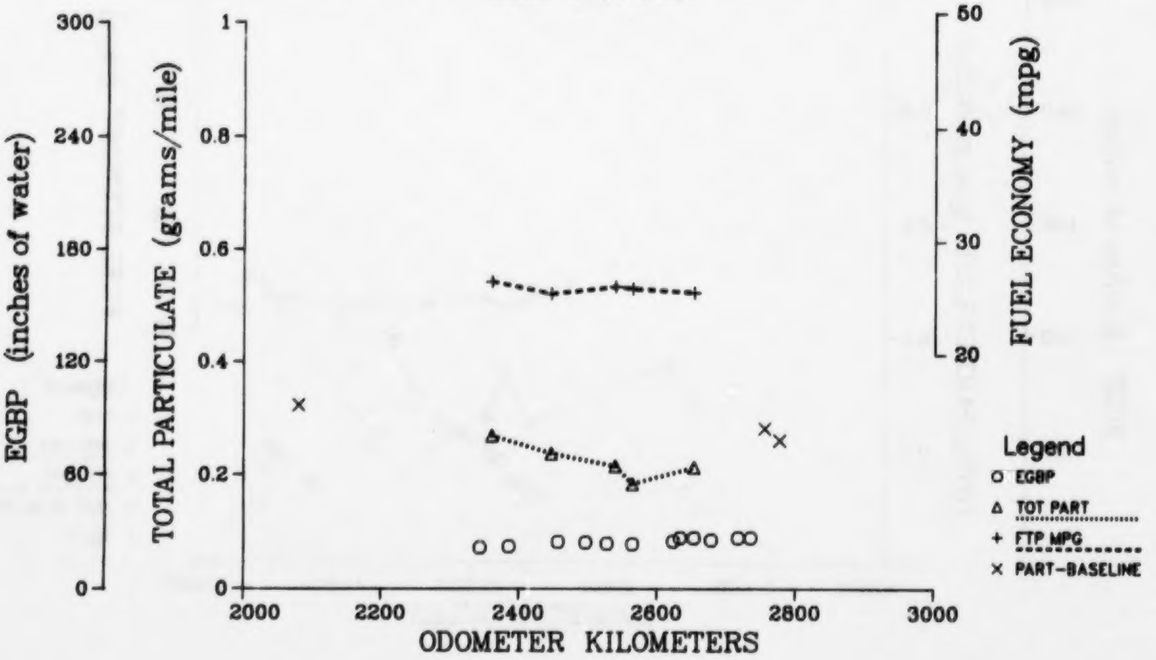


FIGURE D-13: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
MERCEDES CAR EQUIPPED WITH CORNING EX-47 12 IN. NON-CATALYZED
EGBP @ 60 MPH

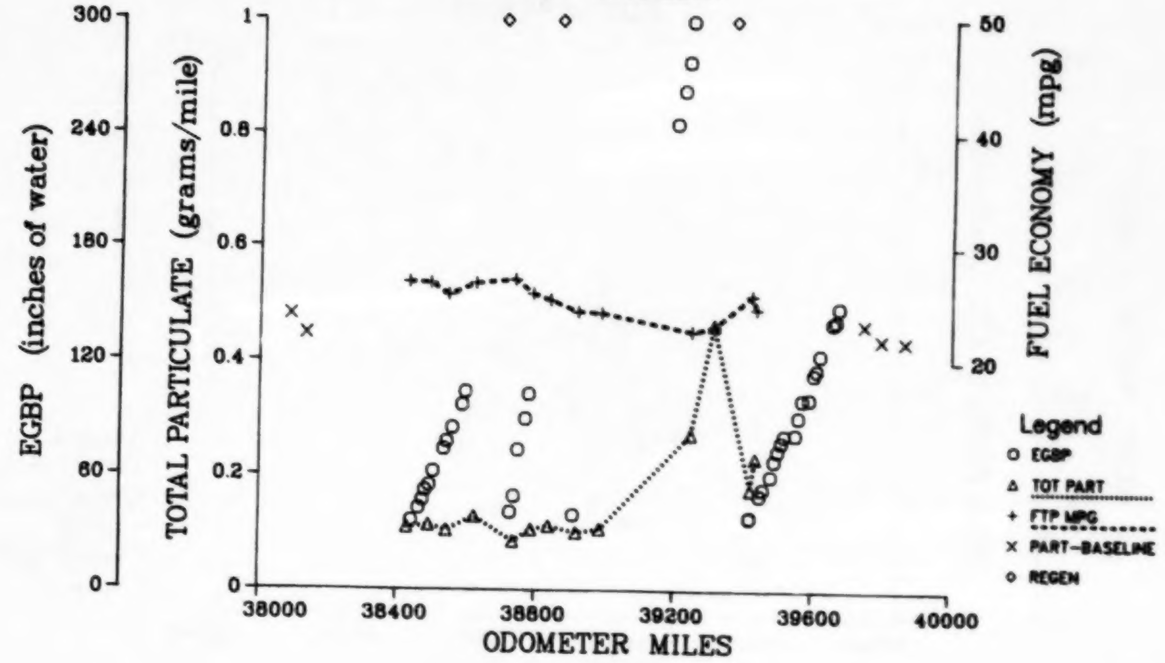


FIGURE D-14: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
MERCEDES CAR EQUIPPED WITH CORNING EX-47 12 IN. – UOP COATING
EGBP @ 60 MPH

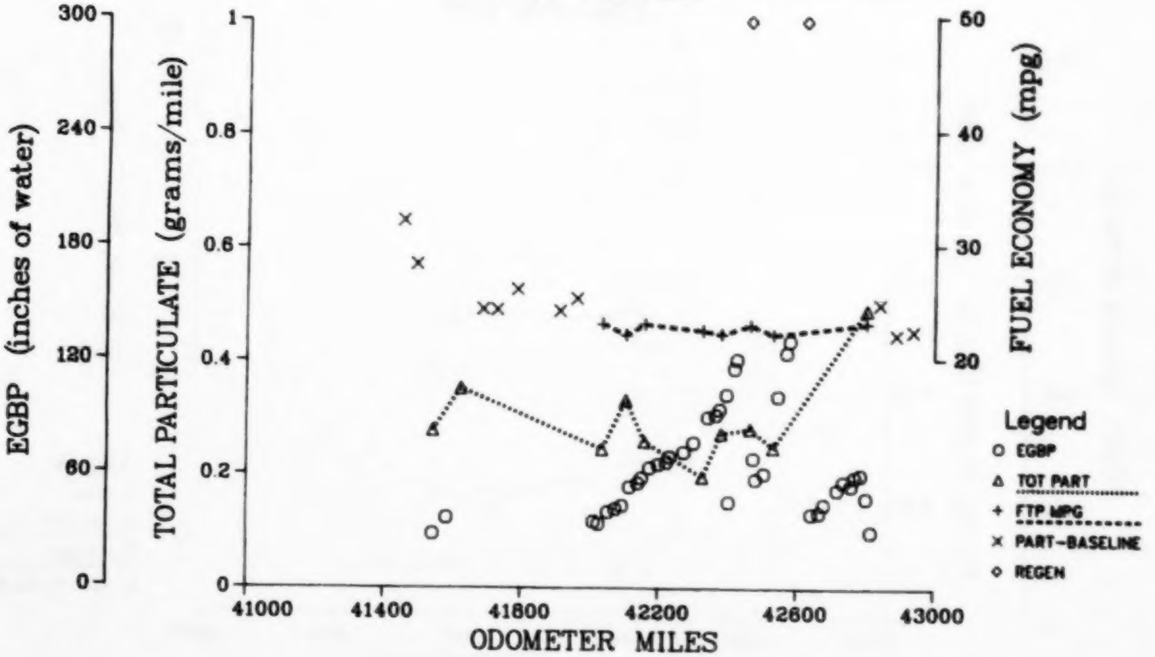


FIGURE D-15: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
MERCEDES CAR EQUIPPED WITH CORNING EX-47 12 IN. UNCATALYZED #2
EGBP @ 60 MPH

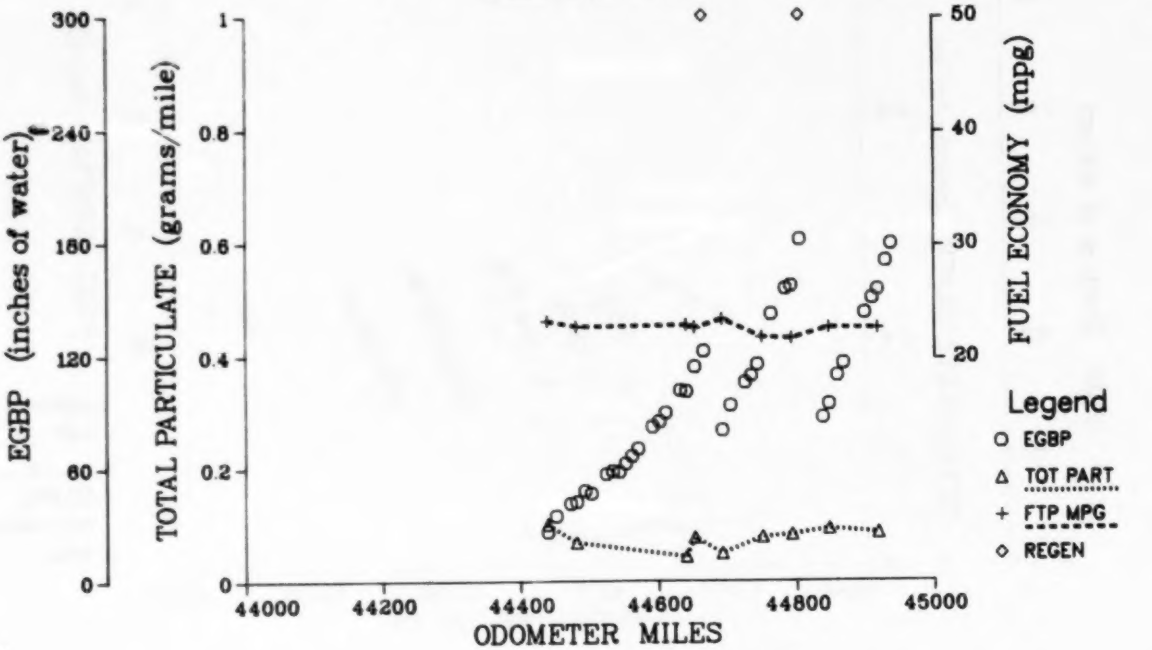


FIGURE D-16: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
TOYOTA CAR EQUIPPED WITH NGK #1 TRAP
EGBP @ 60 MPH

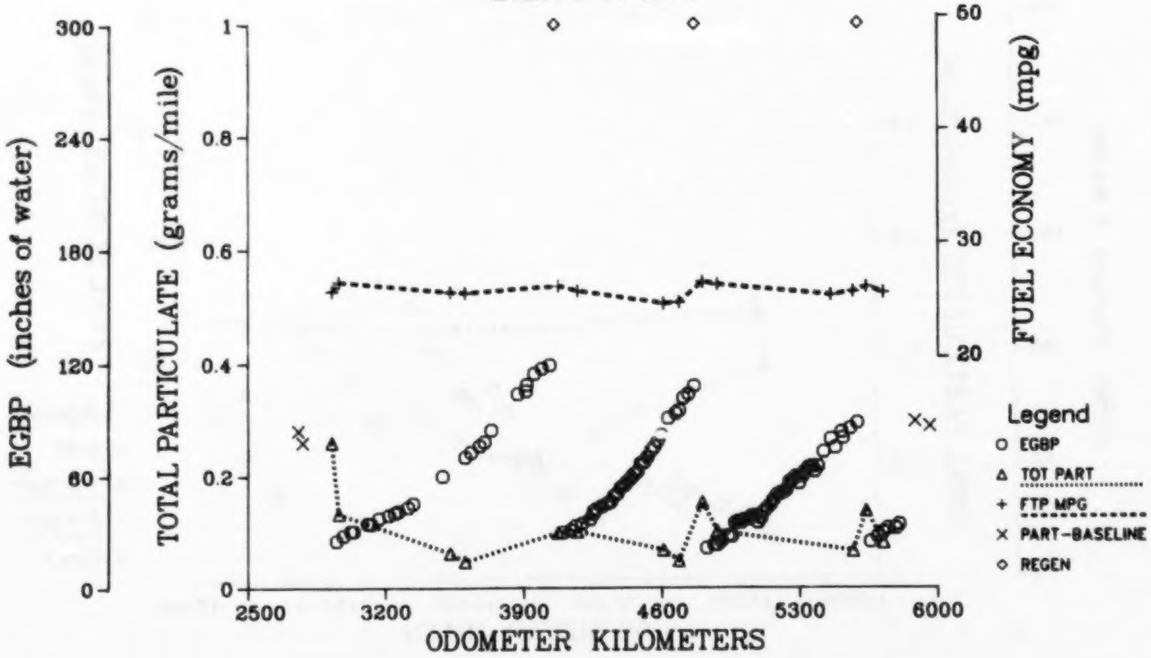


FIGURE D-17: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
MERCEDES CAR EQUIPPED WITH NGK #2 TRAP
EGBP @ 60 MPH

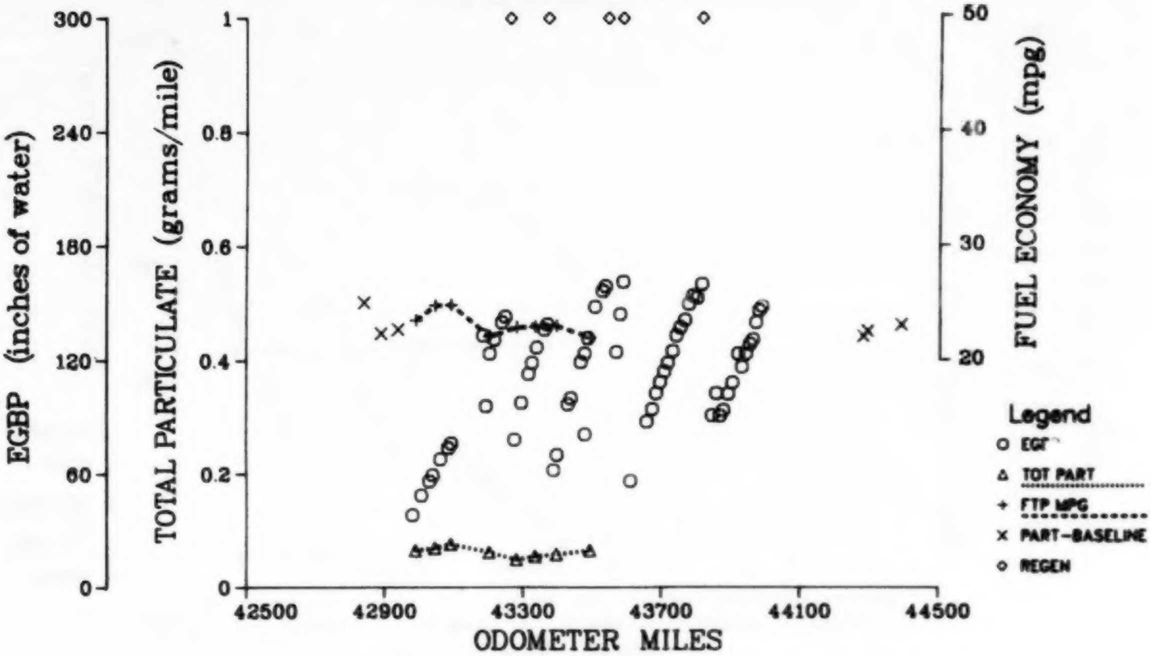
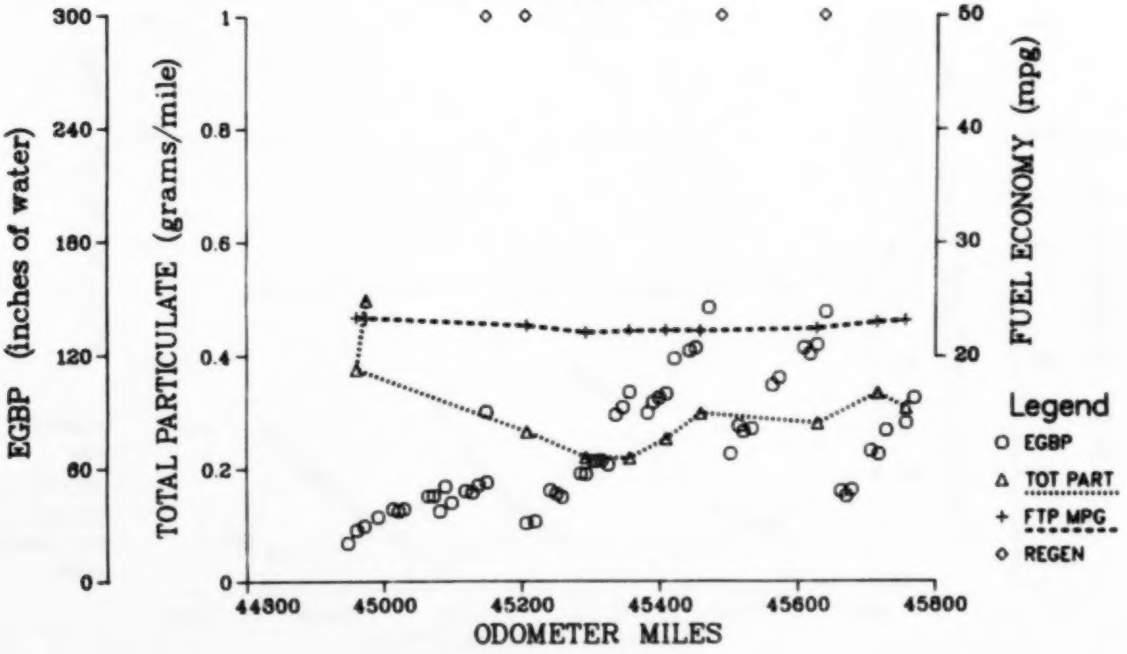


FIGURE D-18: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
MERCEDES CAR EQUIPPED WITH NGK #3 TRAP
EGBP @ 60 MPH



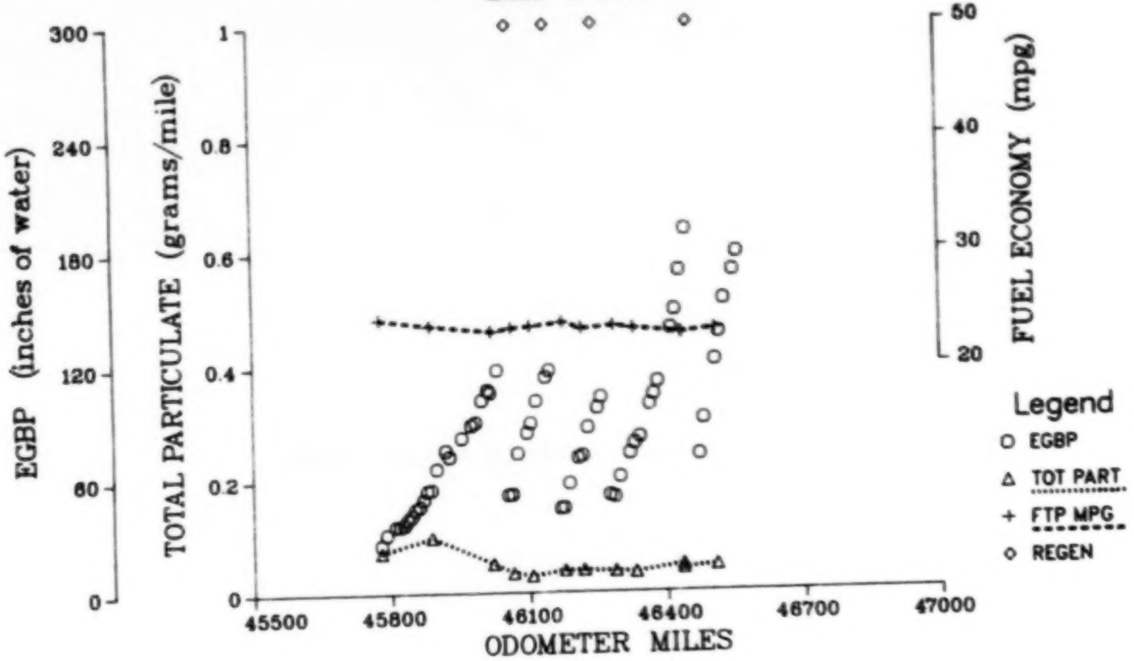


FIGURE D-19: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
MERCEDES CAR EQUIPPED WITH NGK #4-1 TRAP
EGBP @ 60 MPH

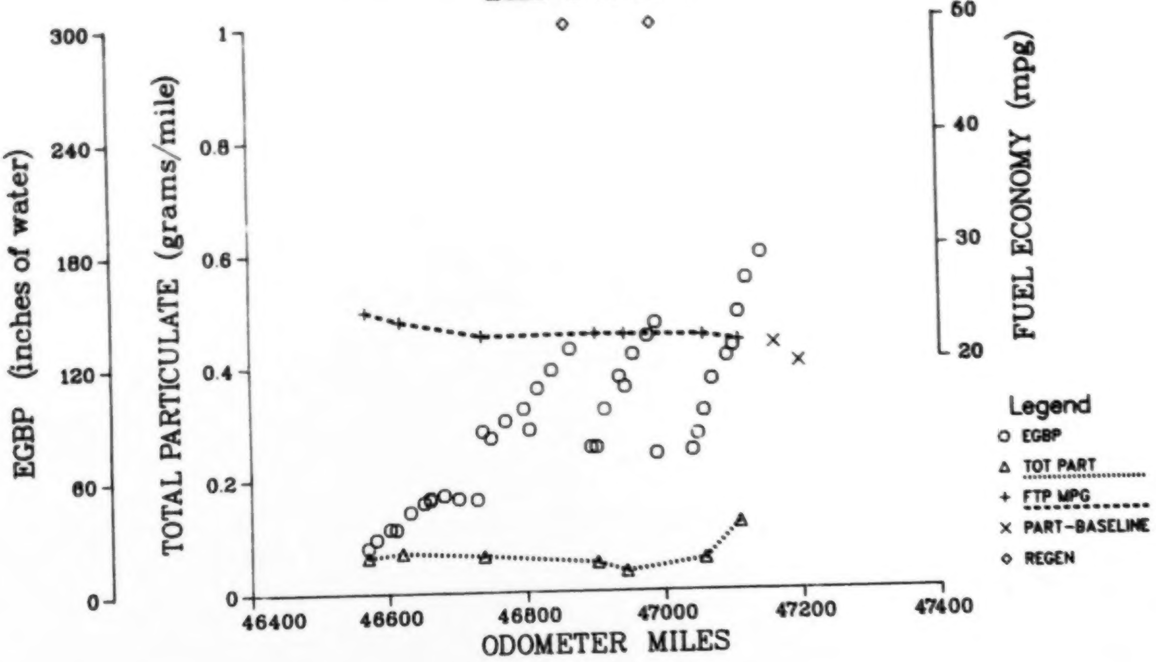


FIGURE D-20: EGBP, PARTICULATE AND FUEL ECONOMY VS. MILEAGE
MERCEDES CAR EQUIPPED WITH NGK #4-2 TRAP
EGBP @ 60 MPH

Appendix E

Sulfate (SO_4) Emissions

Appendix E-1

Sulfate (SO_4) and Total Particulate Emissions (TP)

Mercedes

Trap	Test Cycle	Emissions (g/mi)		% TP as SO_4
		TP	SO_4	
Texaco A-1R w CST-1	Cold LA-4 Bag 1	.450	.0631	14.0%
Texaco A-1R w CST-1	Cold LA-4 Bag 2	.297	.0141	4.75%
Texaco A-1R w CST-1	Hot LA-4 Bag 1	.347	.0922	26.6%
Texaco A-1R w CST-1	Hot LA-4 Bag 2	.257	.0167	6.49%
Texaco A-1R w CST-1	HWFE	.699	.4310	61.7%
Texaco A-1R w CST-1	HWFE	.653	.4350	66.6%
ICI Saffil	Cold LA-4 Bag 1	1.010	.039	3.86%
ICI Saffil	Cold LA-4 Bag 2	.727	.2267	31.2%
ICI Saffil	Hot LA-4 Bag 1	.865	.0456	5.27%
ICI Saffil	Hot LA-4 Bag 2	.884	.0130	1.47%
ICI Saffil	HWFE	.602	.0797	13.2%
ICI Saffil	HWFE	.591	.0539	9.12%
Corning EX-47 12" with UOP	CFDC	.032	.013	40.4%
	CFDC	.147	.067	45.4%
Corning EX-47 12" with UOP	Regen Throttled	2.131	1.040	48.8%
	Regen Unthrottled	.175	.059	33.7%
Corning EX-47 12" with UOP	Regen Throttled	2.527	1.357	53.7%
	Regen Unthrottled	1.629	.848	52.0%

Appendix E-1 (Con't)

Sulfate (SO_4) and Total Particulate Emissions (TP)

Mercedes

Trap	Test Cycle	Emissions (g/mi) TP	SO_4	% TP as SO_4
Corning EX-47 12" non-catalayzed (#1)	Hot LA-4 Bag 1	.064	.009[illegible]	14.1%
	Hot LA-4 Bag 2	.081	.0035	4.32%
Corning EX-47 12" non-catalayzed (#1)	Hot LA-4 Bag 1	.127	.0223	17.6%
	Hot LA-4 Bag 2	.087	.0056	6.43%
Corning EX-47 12" non-catalayzed (#1)	Hot LA-4 Bag 1	.147	.0129	8.79%
	Hot LA-4 Bag 2	.185	.0082	4.43%
Corning EX-47 12" non-catalayzed (#1)	Hot LA-4 Bag 2	.410	.0216	5.27%
Corning EX-47 12" non-catalayzed (#1)	Hot LA-4 Bag 1	.209	.0205	9.81%
	Hot LA-4 Bag 2	.276	.0169	6.12%
Corning EX-47 12" non-catalayzed (#1)	Hot LA-4 Bag 1	.155	.0053	3.42%
	Hot LA-4 Bag 2	.111	.0115	10.3%
Corning EX-47 12" non-catalayzed (#1)	Hot LA-4 Bag 1	.257	.0389	15.1%
	Hot LA-4 Bag 2	.207	.0513	24.8%
Corning EX-47 12" non-catalayzed (#1)	Hot LA-4 Bag 1	.207	.0196	9.47%
	Hot LA-4 Bag 2	.202	.0236	11.7%
Corning EX-47 12" non-catalayzed (#2)	Regen Throttled	.106	.035	32.8%
	Regen Unthrottled	.188	.081	43.2%
Corning EX-47 12" non-catalayzed (#2)	Regen Throttled	.061	.023	37.4%
	Regen Unthrottled	.171	.040	23.4%
NGK #2	CFDC	.017	.003	14.6%
NGK #2	Regen Throttled	.141	.065	45.8%
NGK #2	Regen Unthrottled	.102	.031	30.6%
NGK #2	Regen Throttled	.151	.029	19.0%
NGK #2	Regen Unthrottled	.134	.079	59.0%
NGK #2	Regen Throttled	.064	.028	43.7%
NGK #2	Regen Unthrottled	.538	.052	9.73%

Appendix E-2

Sulfate (SO_4) and Total Particulate Emissions (TP)

Peugeot

Trap	Test Cycle	Emissions (g/mi) TP	 SO_4	% TP as SO_4
Baseline	Cold LA-4 Bag 1	.545	.01714	3.14%
Baseline	Cold LA-4 Bag 2	.592	.0074	1.25%
Baseline	Hot LA-4 Bag 1	.401	.0127	3.17%
Baseline	Hot LA-4 Bag 2	.384	.00576	1.50%
Baseline	HWFE	.374	.0190	5.08%
Baseline	HWFE	.302	.0167	5.52%
JM-4 #1	Cold LA-4 Bag 1	.392	.268	68.4%
JM-4 #1	Cold LA-4 Bag 2	.164	.038	23.1%
JM-4 #1	Hot LA-4 Bag 1	.564	.447	79.3%
JM-4 #1	Hot LA-4 Bag 2	.183	.1445	79.0%
JM-4 #1	HWFE	.677	.586	86.5%
JM-4 #1	HWFE	.784	.677	86.3%

Appendix E-3

Sulfate (SO_4) and Total Particulate Emissions (TP)

Toyota

Trap	Test Cycle	Emissions (g/mi) TP	Emissions (g/mi) SO_4	% TP as SO_4
Baseline	CFDC	.200	.017	8.43%
Baseline	CFDC	.211	.014	6.76%
NGK #1	CFDC	.031	.002	7.44%
NGK #1	CFDC	.022	.003	11.7%
NGK #1	Regen Throttled	.072	.025	34.3%
NGK #1	Regen Unthrottled	.155	.054	35.0%
NGK #1	Regen Throttled	.079	.016	20.2%
NGK #1	Regen Unthrottled	.062	.007	11.2%
NGK #1	Regen Throttled	.103	.015	14.7%
NGK #1	Regen Unthrottled	.138	.035	25.3%

Appendix F

Particulate Data on Certification Tests Conducted at EPA

APPENDIX F-1

DATA ON ALL DIESEL CAR FTP TESTS CONDUCTED BY EPA'S CERTIFICATION DIVISION THROUGH JUNE 30, 1983

Through Model Year 1983

		Test	Odom	----- Emissions (g/mi) -----				F.E.	ETW	--Engine--		Tr	EGR	Trbo	Model
Mfr	Model (Car Line)	Type	(mi)	HC	CO	NOx	TP	(mpg)	(lb)	CID	Conf	an	?	?	Year(s)
AUDI	QUANTUM WGN	EMIS	3971	.195	.79	1.17	.184	36.0	2875	97	L-4	M5	No	No	82
AUDI	4000/COUPE	EMIS	4033	.200	.94	1.24	.244	35.6	2750	97	L-4	M5	No	Yes	82
AUDI	4000/COUPE	EMIS	4207	.114	.61	1.18	.152	34.1	2750	97	L-4	A3	No	Yes	82
AUDI	4000/COUPE	EMIS	3918	.210	.67	1.16	.149	33.1	2750	97	L-4	A3	No	Yes	82
AUDI	4000/COUPE	EMIS	3943	.177	.70	1.21	.142	36.4	2750	97	L-4	M5	No	Yes	82
AUDI	4000/COUPE	EMIS	3949	.323	1.19	1.33	.336	37.0	2625	97	L-4	M5	No	No	82
AUDI	4000/COUPE	FE	3993	.201	.68	1.14	.203	40.8	2625	97	L-4	M5	No	No	82
AUDI	5000	EMIS	3897	.296	.53	1.29	.379	26.8	3250	121	L-5	M5	No	No	81
AUDI	5000	EMIS	3901	.433	2.05	1.32	.382	26.7	3250	121	L-5	M5	No	No	82
AUDI	5000	EMIS	3901	.266	.75	1.27	.181	27.5	3250	121	L-5	A3	No	Yes	82
GM	CHEVETTE	EMIS	4123	.172	.54	1.06	.163	35.0	2500	111	L-4	L3	No	No	81
GM	CHEVETTE	FE	5493	.178	.48	1.02	.124	36.0	2625	111	L-4	L3	No	No	83&82&81
GM	CHEVETTE	EMIS	5237	.168	.44	.99	.142	36.7	2625	111	L-4	L3	No	No	83&82&81
GM	CHEVETTE	EMIS	4098	.152	.66	1.19	.207	40.1	2500	111	L-4	M5	No	No	81
GM	CHEVETTE	EMIS	5903	.140	.53	1.06	.138	42.9	2625	111	L-4	M5	No	No	83&82&81
GM	CHEVETTE	EMIS	5281	.151	.59	1.14	.217	41.5	2625	111	L-4	M5	No	No	83&82&81
GM	CHEVETTE	FE	5650	.134	.55	1.17	.150	42.2	2625	111	L-4	M5	No	No	83&82&81
GM	CHEVETTE	EMIS	5237	.141	.58	1.25	.189	40.5	2625	111	L-4	M5	No	No	83&82&81
GM	CHEVETTE	FE	5440	.173	.59	1.07	.171	36.0	2500	111	L-4	L3	No	No	81
GM	CHEVETTE	FE	5599	.266	.73	1.12	.236	41.0	2500	111	L-4	M5	No	No	81
GM	CHEVETTE	FE	5531	.249	.72	1.15	.203	39.5	2500	111	L-4	M5	No	No	81
GM	CHEVETTE	FE	5789	.221	.71	1.08	.208	40.6	2500	111	L-4	M5	No	No	81
GM	CHEVETTE	FE	7908	.202	.55	1.12	.162	42.0	2625	111	L-4	M5	No	No	83&81
GM	CHEVETTE	FE	8240	.187	.59	1.11	.176	43.6	2500	111	L-4	M5	No	No	83&81
GM	CUTLASS SUPREME	FE	8415	.186	.61	1.38	.207	24.2	3750	263	V-6	L3	Yes	No	82
GM	MONTE CARLO	FE	7777	.182	.76	1.32	.179	24.8	3750	263	V-6	L3	Yes	No	82
GM	MONTE CARLO	EMIS	3993	.120	.58	1.21	.209	24.5	3750	263	V-6	L3	Yes	No	82
GM	CUTLASS CIERA	FE	7238	.160	.74	1.31	.187	27.1	3250	263	V-6	L3	Yes	No	82
GM	CELEBRITY	FE	7196	.176	.75	1.32	.211	26.2	3375	263	V-6	L3	Yes	No	82
GM	CELEBRITY	FE	7156	.172	.76	1.32	.218	25.6	3375	263	V-6	L3	Yes	No	82
GM	CELEBRITY	EMIS	3982	.170	.51	1.46	.246	24.4	3375	263	V-6	L3	Yes	No	82
GM	CELEBRITY	EMIS	4076	.166	.67	1.48	.246	24.8	3375	263	V-6	L3	Yes	No	82
GM	CUTLASS CIERA	FE	3520	.124	.75	1.07	.239	28.1	3250	263	V-6	L3	Yes	No	83
GM	CENTURY	FE	3477	.153	.71	1.09	.240	26.7	3375	263	V-6	L3	Yes	No	83
GM	CUTLASS CIERA	FE	3435	.159	.67	1.08	.213	26.9	3250	263	V-6	L3	Yes	No	83
GM	CENTURY	FE	3391	.155	.69	1.09	.255	25.9	3375	263	V-6	L3	Yes	No	83
GM	MALIBU WGN	EMIS	5050	.179	.92	.82	.280	25.7	3500	263	V-6	L4	Yes	No	83
GM	MALIBU WGN	EMIS	4844	.153	.85	1.43	.529	25.6	3500	263	V-6	L4	Yes	No	83
GM	CENTURY	EMIS	3927	.116	.65	1.16	.302	26.3	3375	263	V-6	L3	Yes	No	83
GM	CUTLASS SUPREME	FE	2853	.244	.67	1.28	.183	27.1	3750	263	V-6	L3	Yes	No	83
GM	CUTLASS SUPREME	FE	2834	.222	.73	1.13	.204	26.9	3750	263	V-6	L3	Yes	No	83
GM	CUTLASS SUPREME	EMIS	4540	.206	.83	1.16	.223	24.3	3750	263	V-6	L3	Yes	No	83
GM	CUTLASS SUPREME	EMIS	4103	.118	.63	1.23	.324	24.1	3750	263	V-6	L3	Yes	No	82

		Test	Odom	----- Emissions (g/mi) -----				F.E.	ETW	--Engine--		Tr	EGR	Trbo	Model
Mfr	Model (Car Line)	Type	(mi)	HC	CO	NOx	TP	(mpg)	(lb)	CID	Conf	an	?	?	Year(s)
GM	REGAL	EMIS	3871	.216	.77	1.43	.281	22.1	4000	350	V-8	L3	Yes	No	82
GM	REGAL	FE	8001	.222	.82	1.26	.311	22.9	4000	350	V-8	L3	Yes	No	82
GM	DELTA 88	EMIS	3932	.250	.75	1.47	.284	21.4	4250	350	V-8	L3	Yes	No	82
GM	IMPALA/CAPRICE WGN	EMIS	4591	.299	.81	1.40	.292	20.5	4750	350	V-8	L4	Yes	No	82
GM	TORONADO	FE	9887	.273	.88	1.42	.308	21.3	4250	350	V-8	L4	Yes	No	82
GM	RIVIERA	EMIS	3969	.221	.81	1.42	.387	20.1	4500	350	V-8	L4	Yes	No	82
GM	NINETY-EIGHT	FE	8731	.182	.82	1.31	.342	22.2	4500	350	V-8	L4	Yes	No	82
GM	NINETY-EIGHT	FE	7847	.309	.88	1.19	.297	22.6	4500	350	V-8	L3	Yes	No	82
GM	DELTA 88	FE	8643	.183	.83	1.38	.332	22.3	4250	350	V-8	L4	Yes	No	82
GM	NINETY-EIGHT	FE	8687	.159	.81	1.42	.333	22.0	4500	350	V-8	L4	Yes	No	82
GM	DELTA 88	FE	7934	.317	.99	1.21	.305	22.7	4250	350	V-8	L3	Yes	No	82
GM	IMPALA/CAPRICE	FE	7890	.335	.88	1.23	.295	22.9	4250	350	V-8	L3	Yes	No	82
GM	DELTA 88	FE	8957	.156	.79	1.30	.310	22.9	4250	350	V-8	L4	Yes	No	82
GM	LESABRE	EMIS	4793	.197	1.08	1.12	.237	22.2	4500	350	V-8	L3	Yes	No	83
GM	IMPALA/CAPRICE WGN	EMIS	1276	.260	.80	1.56	.335	20.1	4750	350	V-8	L4	Yes	No	82
GM	IMPALA/CAPRICE WGN	EMIS	1317	.252	.83	1.67	.315	20.1	4750	350	V-8	L4	Yes	No	82
GM	RIVIERA	FE	5584	.261	1.04	1.21	.401	21.4	4500	350	V-8	L4	Yes	No	83
GM	RIVIERA	EMIS	4275	.194	.97	1.24	.414	21.0	4500	350	V-8	L4	Yes	No	83
GM	REGAL	EMIS	1317	.200	.87	1.51	.345	21.3	4000	350	V-8	L3	Yes	No	82
GM	CUTLASS SPRM/CAL	EMIS	3968	.322	1.00	1.48	.344	21.6	4000	350	V-8	L3	Yes	No	81
GM	DELTA 88	EMIS	4039	.312	1.02	1.47	.363	20.9	4250	350	V-8	L3	Yes	No	81
GM	IMPALA/CAPRICE WGN	EMIS	3953	.274	1.24	1.02	.702	19.7	4750	350	V-8	L3	Yes	No	81
GM	IMPALA/CAPRICE WGN	EMIS	4056	.378	1.18	1.30	.411	19.4	4750	350	V-8	L3	Yes	No	81
GM	IMPALA/CAPRICE WGN	EMIS	3956	.340	1.04	1.43	.357	19.7	4750	350	V-8	L3	Yes	No	81
GM	SEVILLE	EMIS	4028	.427	1.24	1.13	.456	20.3	4500	350	V-8	A3	Yes	No	81
GM	DELTA 88	EMIS	3961	.267	.98	1.59	.337	20.9	4250	350	V-8	L3	Yes	No	81
GM	DELTA 88	EMIS	4030	.265	.92	1.41	.332	21.2	4250	350	V-8	L3	Yes	No	81
ISUZ	I-MARK	FE	4045	.255	.62	1.06	.181	43.7	2500	111	L-4	M4	No	No	83
ISUZ	I-MARK	FE	3911	.204	.57	1.09	.150	41.1	2500	111	L-4	M4	No	No	81
ISUZ	I-MARK	EMIS	3861	.181	.56	1.13	.192	40.1	2500	111	L-4	M4	No	No	81
ISUZ	I-MARK	EMIS	3934	.339	.79	1.06	.245	36.2	2625	111	L-4	M5	No	No	81
ISUZ	I-MARK	FE	3988	.297	.77	.99	.222	37.9	2625	111	L-4	M5	No	No	81
ISUZ	I-MARK	FE	4047	.266	.59	1.18	.198	39.9	2625	111	L-4	M5	No	No	82&81
ISUZ	I-MARK	EMIS	3878	.247	.72	1.10	.181	32.7	2750	111	L-4	A3	No	No	81
ISUZ	I-MARK	FE	4010	.253	.59	1.07	.182	35.4	2750	111	L-4	A3	No	No	82&81
MERC	240D	EMIS	3966	.217	.95	1.27	.409	29.0	3500	147	L-4	M4	No	No	81
MERC	240D	EMIS	4016	.233	.80	1.43	.320	26.6	3500	147	L-4	A4	No	No	81
MERC	240D	EMIS	4071	.215	.78	1.42	.357	27.0	3500	147	L-4	A4	No	No	81
MERC	240D	EMIS	3969	.204	.75	1.52	.373	26.1	3500	147	L-4	A4	No	No	81
MERC	240D	EMIS	4409	.159	.98	1.09	.448	28.8	3500	147	L-4	M4	Yes	No	82
MERC	240D	EMIS	3989	.190	1.01	1.16	.461	28.6	3500	147	L-4	M4	Yes	No	82
MERC	240D	EMIS	4427	.144	.93	1.09	.354	28.9	3500	147	L-4	M4	Yes	No	82
MERC	240D	EMIS	4094	.196	.80	1.13	.344	26.9	3500	147	L-4	A4	Yes	No	82
MERC	300TD	EMIS	3965	.257	.99	1.29	.436	23.7	3875	183	L-5	A4	Yes	No	81
MERC	300TD	EMIS	3951	.205	.82	1.32	.375	24.8	4000	183	L-5	A4	Yes	Yes	81
MERC	300D	EMIS	4001	.221	.92	1.29	.382	24.3	3750	183	L-5	A4	Yes	No	81
MERC	300D	EMIS	3954	.197	.91	1.37	.409	23.7	3750	183	L-5	A4	Yes	No	81
MERC	300SD	EMIS	4040	.206	1.09	1.20	.501	25.9	4000	183	L-5	A4	Yes	Yes	81
MERC	300SD	EMIS	4000	.176	1.10	1.31	.548	24.9	4000	183	L-5	A4	Yes	Yes	81
MERC	300SD	EMIS	4226	.218	.93	1.13	.484	26.6	4000	183	L-5	A4	Yes	Yes	81

Mfr	Model (Car Line)	Test	Odom	----- Emissions (g/mi) -----				F.E.	ETW	--Engine--		Tr	EGR	Trbo	Model
		Type	(mi)	HC	CO	NOx	TP	(mpg)	(lb)	CID	Conf	an	?	?	Year(s)
NISS	NISSAN SENTRA	FE	6240	.159	.75	.80	.167	47.6	2250	103	L-4	M4	Yes	No	83
NISS	NISSAN SENTRA WGN	FE	4153	.215	.93	.96	.227	42.9	2500	103	L-4	M5	Yes	No	83
NISS	NISSAN SENTRA WGN	EMIS	4172	.211	.92	.96	.212	41.0	2500	103	L-4	M5	Yes	No	83
NISS	NISSAN SENTRA	FE	4158	.099	.59	.86	.238	39.9	2375	103	L-4	A3	Yes	No	83
NISS	NISSAN SENTRA	FE	4362	.109	.62	.80	.250	39.7	2375	103	L-4	A3	Yes	No	83
NISS	NISSAN SENTRA WGN	EMIS	4201	.094	.58	.87	.222	39.4	2500	103	L-4	A3	Yes	No	83
NISS	810 WGN	EMIS	4043	.193	1.20	1.14	.226	29.5	3375	170	L-6	M5	Yes	No	82
NISS	810 WGN	EMIS	4050	.184	.90	1.00	.276	28.4	3375	170	L-6	L3	Yes	No	81
NISS	810	EMIS	4319	.197	1.02	1.14	.239	26.8	3375	170	L-6	L3	Yes	No	81
PEUG	504 WGN	EMIS	4206	.312	1.26	.78	.310	27.2	3750	141	L-4	M4	Yes	No	82
PEUG	604	EMIS	4203	.200	1.24	1.34	.326	26.8	3750	141	L-4	M5	Yes	Yes	82
PEUG	604	EMIS	4060	.203	.97	1.11	.252	23.4	3750	141	L-4	A3	Yes	Yes	82
PEUG	604	EMIS	4109	.287	1.09	1.13	.283	23.4	3750	141	L-4	A3	Yes	Yes	82
PEUG	604	EMIS	4092	.122	.78	1.08	.238	25.3	3750	141	L-4	A3	Yes	Yes	82
PEUG	604	EMIS	4017	.128	1.45	1.12	.239	27.3	3750	141	L-4	M5	Yes	Yes	82
PEUG	505	EMIS	4018	.104	.74	.97	.272	28.1	3500	141	L-4	A3	Yes	Yes	82
PEUG	505	EMIS	4128	.162	1.01	1.06	.223	28.7	3500	141	L-4	M5	Yes	Yes	82
PEUG	504 WGN	EMIS	4292	.298	1.42	.80	.399	25.4	3625	141	L-4	M4	Yes	No	81
PEUG	504 WGN	EMIS	4336	.324	1.48	.82	.384	25.6	3625	141	L-4	M4	Yes	No	81
PEUG	505	EMIS	4297	.195	1.37	.97	.492	27.7	3500	141	L-4	M4	Yes	No	81
*REN	18 i WGN	EMIS	4195	.248	.92	1.21	.227	33.1	3000	126	L-4	M5	No	No	82
*REN	18 i WGN	FE	4264	.253	.94	1.22	.251	33.0	2875	126	L-4	M5	No	No	82
*REN	18 i WGN	FE	4139	.241	.85	1.36	.247	32.9	2875	126	L-4	M5	No	No	82
*REN	18 i	FE	4187	.230	1.02	1.27	.309	33.9	2875	126	L-4	M5	No	No	82
*REN	18 i	FE	4167	.257	1.00	1.31	.295	32.9	2750	126	L-4	M5	No	No	82
VW	RABBIT	FE	4466	.232	.75	.87	.176	45.0	2375	97	L-4	M4	No	No	81
VW	RABBIT	FE	4373	.366	.95	.88	.208	42.8	2375	97	L-4	M4	No	No	81
VW	RABBIT	FE	4415	.345	.80	.83	.184	45.6	2375	97	L-4	M4	No	No	81
VW	DASHER WGN	EMIS	3994	.396	1.10	1.04	.307	36.0	2625	97	L-4	M4	No	No	81
VW	RABBIT	EMIS	4102	.329	.96	.89	.182	42.8	2250	97	L-4	M4	No	No	81
VW	RABBIT	EMIS	3949	.233	.76	1.03	.215	41.4	2250	97	L-4	M4	No	No	81
VW	RABBIT	EMIS	3992	.272	.90	1.00	.209	42.4	2250	97	L-4	M4	No	No	81
VW	RABBIT	EMIS	3922	.190	.67	1.04	.206	40.0	2375	97	L-4	M4	No	No	81
VW	RABBIT	EMIS	3918	.245	1.10	1.03	.263	38.2	2375	97	L-4	M5	No	No	81
VW	RABBIT	EMIS	3967	.316	.74	1.07	.370	38.1	2375	97	L-4	M5	No	No	81
VW	RABBIT	EMIS	4053	.268	.80	.96	.217	38.0	2375	97	L-4	M5	No	No	81
VW	RABBIT	EMIS	3942	.499	1.00	.92	.277	45.2	2250	97	L-4	M4	No	No	81
VW	RABBIT	FE	4015	.228	.80	.86	.191	43.1	2375	97	L-4	M4	No	No	82
VW	RABBIT	EMIS	3969	.223	.73	.84	.162	44.1	2375	97	L-4	M4	No	No	82
VW	RABBIT	FE	4058	.196	.79	.81	.174	44.9	2375	97	L-4	M4	No	No	82
VW	RABBIT	FE	4112	.204	.83	.80	.185	44.6	2375	97	L-4	M4	No	No	82
VW	RABBIT	FE	4040	.163	.65	.78	.162	46.1	2375	97	L-4	M4	No	No	82
VW	RABBIT	EMIS	3982	.238	.89	.81	.169	43.3	2375	97	L-4	M4	No	No	82
VW	QUANTUM WGN	FE	4040	.154	.65	1.02	.204	36.9	2875	97	L-4	M5	No	No	82
VW	QUANTUM	FE	4082	.283	1.00	1.02	.252	36.0	2750	97	L-4	M5	No	No	82
VW	QUANTUM	FE	4123	.176	.67	.92	.181	39.2	2750	97	L-4	M5	No	No	82
VW	QUANTUM WGN	EMIS	3998	.256	.85	1.14	.305	33.5	2875	97	L-4	M5	No	No	82
VW	JETTA	FE	3903	.285	.90	.82	.197	40.0	2500	97	L-4	M4	No	No	82

Mfr	Model (Car Line)	Test Type	Odom (mi)	----- Emissions (g/mi) ----- HC	CO	NOx	TP	F.E. (mpg)	ETW (lb)	--Engine-- CID	Conf	Tr an	EGR ?	Trbo ?	Model Year(s)
VW	RABBIT	FE	3953	.164	.79	1.21	.198	43.0	2250	97	L-4	M4	No	No	83
VW	RABBIT	EMIS	3903	.171	.77	1.01	.202	46.9	2250	97	L-4	SA	No	No	83
VW	RABBIT	FE	3996	.154	.78	1.15	.187	46.5	2250	97	L-4	SA	No	No	83
VW	RABBIT	EMIS	4132	.170	.70	1.04	.188	50.0	2250	97	L-4	SA	No	No	83
VW	RABBIT	FE	4189	.132	.56	.97	.160	51.3	2250	97	L-4	SA	No	No	83
VW	RABBIT	FE	4207	.125	.49	.93	.145	50.3	2250	97	L-4	SA	No	No	83
VW	RABBIT	FE	4086	.177	.81	1.12	.206	46.9	2250	97	L-4	SA	No	No	83
VW	RABBIT	EMIS	3948	.207	.69	1.01	.169	34.9	2375	97	L-4	A3	No	No	83
VW	RABBIT	EMIS	3858	.199	.84	.91	.161	45.4	2375	97	L-4	M4	No	No	83
VW	QUANTUM	FE	4110	.150	.65	.97	.149	40.5	2750	97	L-4	M5	No	Yes	82
VW	QUANTUM	FE	4032	.172	.84	1.15	.207	36.1	2750	97	L-4	M5	No	Yes	82
VW	QUANTUM WGN	EMIS	3991	.179	.85	1.14	.239	35.8	2875	97	L-4	M5	No	Yes	82
VW	QUANTUM WGN	EMIS	3948	.175	.57	1.22	.176	32.0	2875	97	L-4	A3	No	Yes	82
VW	QUANTUM	EMIS	4108	.184	.86	1.11	.213	37.1	2750	97	L-4	M5	No	Yes	82
VW	QUANTUM WGN	EMIS	3980	.178	.86	1.16	.241	39.6	2875	97	L-4	M5	No	Yes	82
VW	QUANTUM	EMIS	4292	.112	.60	1.22	.158	33.6	2750	97	L-4	A3	No	Yes	82
VW	QUANTUM WGN	EMIS	4145	.134	.66	1.22	.181	31.5	2875	97	L-4	A3	No	Yes	82
VW	JETTA	EMIS	3906	.200	.89	1.01	.208	39.7	2500	97	L-4	M5	No	Yes	82
VW	JETTA	EMIS	3904	.232	.83	1.05	.181	33.9	2625	97	L-4	A3	No	Yes	82
VW	RABBIT	FE	3958	.190	.92	1.09	.235	39.0	2375	97	L-4	M5	No	Yes	83
VW	RABBIT	FE	4127	.183	.87	1.13	.223	41.0	2375	97	L-4	M5	No	Yes	83
VOLV	VOLVO SEDAN	EMIS	3950	.597	1.53	1.23	.281	25.9	3375	145	L-6	A3	No	No	81
VOLV	VOLVO SEDAN	EMIS	4013	.723	1.66	1.17	.315	26.0	3375	145	L-6	A3	No	No	81
VOLV	VOLVO STAT WGN	EMIS	3622	.275	1.22	1.34	.292	29.0	3500	145	L-6	M4	No	No	81
VOLV	VOLVO SEDAN	EMIS	3881	.184	.94	1.22	.307	26.2	3375	145	L-6	A3	No	No	81
VOLV	VOLVO SEDAN	DURB	44135	.155	.86	1.34	.421	26.7	3375	145	L-6	A3	No	No	81
VOLV	VOLVO MID SEDAN	EMIS	3976	.292	.96	1.13	.257	26.7	3375	145	L-6	A3	No	Yes	83
VOLV	VOLVO MID SEDAN	EMIS	4080	.264	1.13	1.12	.306	27.8	3375	145	L-6	M5	No	Yes	83

APPENDIX F-2

DATA ON ALL DIESEL TRUCK FTP TESTS CONDUCTED BY EPA'S CERTIFICATION DIVISION THROUGH JUNE 30, 1983

Through Model Year 1983

Mfr.	Model (Truck Line)	Test Type	Odom (mi)	----- Emissions (g/mi) -----				F.E. (mpg)	ETW (lb)	--Engine--		Tran	EGR ?	Trbo ?	Model Year(s)
				HC	CO	NOx	TP			CID	Conf				
FORD	RANGER P/U 2WD	EMIS	4120	.210	.80	.90	.187	33.5	3250	134	L-4	M4	No	No	83
FORD	RANGER P/U 2WD	EMIS	3953	.190	.70	.91	.187	34.8	3250	134	L-4	M4	No	No	83
FORD	RANGER P/U 2WD	EMIS	4241	.220	1.00	1.14	.286	33.2	3250	134	L-4	M4	No	No	83
FORD	RANGER P/U 2WD	FE	6088	.200	.90	1.26	.244	34.5	3250	134	L-4	M4	No	No	83
GM	S10 P/U 2WD	EMIS	4265	.289	1.10	2.03	.195	33.2	3375	137	L-4	M5	No	No	83
GM	S10 P/U 2WD	FE	4617	.240	1.00	1.92	.182	35.0	3250	137	L-4	M5	No	No	83
GM	S10 P/U 2WD	EMIS	4265	.290	1.10	2.03	.195	33.2	3375	137	L-4	M5	No	No	83
GM	EL CAMINO P/U 2WD	FE	3363	.183	.74	1.41	.307	22.5	4000	350	V-8	L3	Yes	No	83
GM	C10 P/U 2WD	EMIS	3994	.740	1.60	2.15	.777	18.8	4750	350	V-8	L3	No	No	81
GM	C10 P/U 2WD	EMIS	3911	.250	1.20	1.14	.792	18.8	5000	350	V-8	L3	Yes	No	81
GM	C10 P/U 2WD	EMIS	4036	.310	1.20	1.31	.461	18.7	4750	350	V-8	L3	Yes	No	81
GM	C10 P/U 2WD	FE	4121	.700	1.70	1.70	.764	18.5	5000	350	V-8	L3	No	No	81
GM	C10 P/U 2WD	FE	4404	.230	.80	2.24	.241	18.8	5000	379	V-8	L4	Yes	No	82
GM	C10 P/U 2WD	EMIS	3996	.190	.80	1.91	.289	20.6	5000	379	V-8	L4	Yes	No	82
GM	C10 P/U 2WD	EMIS	5295	.180	1.00	1.41	.356	21.3	5000	379	V-8	L4	Yes	No	83&82
GM	C10 P/U 2WD	FE	5250	.180	.90	1.64	.331	21.6	5000	379	V-8	L4	Yes	No	83&82
GM	C10 SUBURBAN 2WD	FE	5326	.210	.90	1.68	.228	20.1	5500	379	V-8	L4	Yes	No	83&82
GM	C10 P/U 2WD	FE	7667	.168	1.10	1.37	.420	23.8	4750	379	V-8	M4	Yes	No	83&82
GM	C10 P/U 2WD	FE	7328	.200	.90	1.79	.290	23.7	4750	379	V-8	M4	Yes	No	83&82
GM	C20 P/U 2WD	EMIS	3924	.290	1.10	1.64	.222	19.0	5250	379	V-8	L4	Yes	No	82
GM	K10 SUBURBAN 4WD	FE	4795	.410	1.40	1.42	.299	18.5	6000	379	V-8	L4	Yes	No	82
GM	K10 SUBURBAN 4WD	FE	4765	.400	1.30	1.59	.329	18.1	6000	379	V-8	L4	Yes	No	82
GM	K10 SUBURBAN 4WD	EMIS	3948	.430	1.40	1.42	.301	18.4	6000	379	V-8	L4	Yes	No	82
GM	K10 SUBURBAN 4WD	EMIS	5436	.360	1.20	1.38	.346	18.8	6000	379	V-8	L4	Yes	No	83&82
GM	K20 P/U 4WD	EMIS	4008	.270	1.10	1.52	.384	21.2	5500	379	V-8	M4	Yes	No	82
*IHC	TRAVELER 4WD	EMIS	8145	.190	.80	1.51	.339	19.5	4500	198	L-6	A3	Yes	Yes	81
*IHC	TRAVELER 4WD	EMIS	12265	.120	.70	1.60	.375	20.5	4500	198	L-6	A3	Yes	Yes	81
ISUZ	LUV P/U 2WD	FE	4032	.350	1.30	1.28	.234	33.3	3000	137	L-4	M5	Yes	No	82
ISUZ	LUV P/U 2WD	FE	3980	.350	1.40	1.31	.346	32.0	3000	137	L-4	M5	Yes	No	82
ISUZ	LUV P/U 2WD	FE	4059	.300	1.30	1.26	.258	33.1	3000	137	L-4	M5	Yes	No	82
ISUZ	LUV P/U 2WD	FE	3929	.180	1.10	1.75	.173	32.1	3000	137	L-4	M5	No	No	81
ISUZ	LUV P/U 2WD	EMIS	3865	.220	1.20	1.75	.246	31.4	3125	137	L-4	M5	No	No	81
ISUZ	LUV P/U 4WD	EMIS	3805	.240	1.10	1.79	.289	28.2	3250	137	L-4	M4	No	No	81
ISUZ	P'UP P/U 2WD	FE	4098	.230	1.00	1.49	.237	31.3	3000	137	L-4	A3	No	No	83
ISUZ	P'UP P/U 2WD	FE	4064	.260	1.20	1.14	.302	31.1	3000	137	L-4	A3	Yes	No	83
NISS	P/U 2WD	EMIS	4018	.300	1.00	1.46	.301	32.0	2875	132	L-4	M5	No	No	81
NISS	P/U 2WD	EMIS	4106	.290	.90	1.39	.254	34.0	3000	132	L-4	M5	No	No	81
NISS	P/U 2WD	FE	4046	.390	.90	1.25	.237	32.9	2875	132	L-4	M5	No	No	82
NISS	P/U 2WD	EMIS	3966	.340	.90	1.30	.236	32.7	3125	132	L-4	M5	No	No	82
NISS	P/U 2WD	FE	3927	.330	1.10	1.20	.255	33.0	2875	132	L-4	M5	Yes	No	81
NISS	P/U 2WD	EMIS	3926	.340	1.50	.93	.243	32.1	3125	132	L-4	M5	Yes	No	81
NISS	P/U 2WD	EMIS	3965	.350	1.50	.93	.258	32.6	3125	132	L-4	M5	Yes	No	81
TKM	B2000/2200 P/U 2WD	EMIS	4205	.120	.60	1.20	.191	33.1	3250	135	L-4	M5	No	No	82
TKM	B2000/2200 P/U 2WD	EMIS	4205	.119	.60	1.20	.191	33.1	3250	135	L-4	M5	No	No	83&82

Mfr.	Model (Truck Line)	Test Type	Odom (mi)	----- Emissions (g/mi) -----				F.E. (mpg)	ETW (lb)	--Engine--		Tr an	EGR ?	Trbo ?	Model Year(s)
				HC	CO	NOx	TP			CID	Conf				
TOTA	TRUCK 2WD	EMIS	3936	.410	.90	1.17	.200	31.2	3000	134	L-4	M5	No	No	81
TOTA	TRUCK 2WD	EMIS	3993	.260	.80	1.24	.187	32.1	3125	134	L-4	M5	No	No	81
TOTA	TRUCK 2WD	FE	4020	.200	.70	1.23	.153	32.7	3125	134	L-4	M5	No	No	83&82
TOTA	TRUCK 2WD	EMIS	4103	.100	.80	1.08	.128	33.1	3125	134	L-4	M5	No	No	83
TOTA	TRUCK 2WD	EMIS	4036	.190	.70	1.00	.144	32.2	3125	134	L-4	M5	No	No	83
VW	P/U 2WD	FE	3931	.150	.70	.91	.173	41.3	2375	97	L-4	M4	No	No	82
VW	VANAGON 2WD	EMIS	3883	.180	.80	1.00	.243	31.3	3750	97	L-4	M5	No	No	83
VW	VANAGON 2WD	EMIS	3883	.210	1.00	1.20	.308	28.5	4000	97	L-4	M5	No	No	83
VW	VANAGON 2WD	EMIS	3935	.200	1.90	1.20	.361	28.5	4000	97	L-4	M4	No	No	82
VW	VANAGON 2WD	FE	3935	.200	1.70	1.19	.316	29.5	3625	97	L-4	M4	No	No	82
VW	P/U 2WD	EMIS	3940	.360	1.50	1.06	.270	38.3	2375	97	L-4	M5	No	No	81

Appendix G

Results of Ames Testing

Appendix G-1

Results of Ames Testing

Sample Number	Test Vehicle	Trap	Test Cycle	Test Date	Analysis Date	Acti-vation	Model Predicted Mean Specific Activity for Strain: (revertants per plate / µg extract)			
							TA100	TA1537	TA1538	TA98
790680	Peugeot	Baseline	HWFE	11-06-79	06-19-80	+	5.59		1.65	2.55
					06-19-80	-	16.25		5.51	8.24
					06-27-80	+	2.53		2.10	2.40
					06-27-80	-	14.68		3.72	11.97
790691	Peugeot	Baseline	LA-4	11-06-79	06-19-80	+	2.14		1.08	1.64
					06-19-80	-	11.32		2.20	2.47
					06-27-80	+	2.35		1.96	1.72
					06-27-80	-	13.04		1.96	3.14
790840	Peugeot	JM-4 #1	HWFE	12-08-79	06-17-80	+	19.24		32.39	41.30
					06-17-80	-	206.20		132.85	27.02
					06-24-80	+	22.27		28.52	52.34
					06-24-80	-	34.70		92.30	28.91
790852	Peugeot	JM-4 #1	LA-4	12-08-79	06-17-80	+	56.62		27.79	31.86
					06-17-80	-	74.00		19.20	44.04
					06-24-80	+	67.85		28.57	35.60
					06-24-80	-	73.83		15.56	30.89
800290	Peugeot	JM-4 #2	HWFE	04-08-80	08-05-80	+	21.58		27.87	21.52
					08-05-80	-	23.03		54.79	31.97
800310	Peugeot	JM-4 #2	LA-4	04-17-80	08-05-80	+	8.29		3.92	15.65
					08-05-80	-	11.12		12.64	11.18

Results of Ames Testing (Continued)

Sample Number	Test Vehicle	Trap	Test Cycle	Test Date	Analysis Date	Acti-vation	Model Predicted Mean Specific Activity for Strain: (revertants per plate / µg extract)			
							TA100	TA1537	TA1538	TA98
800260	Mercedes	EX-47 12" non-cat.	LA-4	03-18-80	08-04-80	+	2.41		0.88	0.87
					08-04-80	-	7.21		0.90	2.23
800280	Mercedes	EX-47 12" non-cat.	LA-4	03-20-80	08-05-80	+	15.07		11.15	12.94
					08-05-80	-	17.12		5.10	15.81
810011	Mercedes	ICI 4th generation	HWFE	03-19-81	06-16-81	+	30.0	10.2		7.1
					06-16-81	-	47.2	26.4		14.0
810040	Mercedes	ICI 4th generation	LA-4	02-20-81	06-16-81	+	15.7	4.5		4.8
					06-16-81	-	88.8	5.2		13.1

Appendix G-2

Results of Ames Testing of Prototype Vehicles

Sample Number	Test Vehicle	Test Cycle	Test Date	Analysis Date	Acti-vation	Model Predicted Mean Specific Activity for Strain: (revertants per plate / µg extract)				
						TA100	TA1535	TA1537	TA1538	TA98
790721	Mercedes 300 SD 1980 Cert. Vehicle	HWFE	11/14/79	06/19/80	+	11.13			7.14	15.08
				06/19/80	-	33.72			15.12	15.12
				06/27/80	+	11.18			11.51	15.32
				06/27/80	-	22.54			13.47	13.47
790771	Mercedes 300 TD 1980 Cert. Vehicle	HWFE	11/20/79	06/19/80	+	5.49			9.37	8.65
				06/19/80	-	21.73			17.46	17.46
				06/27/80	+	8.76			54.77	8.90
				06/27/80	-	147.27			11.05	11.05
790800	Mercedes 300 TD 1980 Cert. Vehicle	HWFE	11/21/79	06/19/80	+	4.06			4.28	7.34
				06/19/80	-	15.97			7.96	7.96
				06/27/80	+	5.55			7.74	7.49
				06/27/80	-	15.48			5.91	5.91
790891	Peugeot 504 Turbo Diesel 1981 Calif. Prototype 141 CID	HWFE	12/18/79	06/18/80	+	5.15	0.86	0.68	2.31	3.40
				06/18/80	-	14.35	0.86	1.89	6.10	8.95
				06/25/80	+	4.43	1.40	0.95	2.65	3.10
				06/25/80	-	20.16	0.03	1.52	6.45	9.15
790941	Peugeot 504 Turbo Diesel 1981 Calif. Prototype 141 CID	HWFE	12/20/79	06/18/80	+	2.50	0.05			
				06/18/80	-	14.58	Negative			
				06/25/80	+	2.25	0.19			
				06/25/80	-	15.79				

Appendix G-3

Results of Ames Testing of In-Use Vehicles

Privately Owned, 1978 Model Year, High Mileage (over 40,000 miles), Oldsmobile, 350 CID, Diesel Cars

Sample Number	Test Vehicle	Test Cycle	Test Date	Analysis Date	Acti-vation	Model Predicted Mean Specific Activity for Strain: (revertants per plate / µg extract)				
						TA100	TA1535	TA1537	TA1538	TA98
790911	Delta 88	HWFE	12/20/79	07/30/80	+	5.33			3.46	3.84
				07/30/80	-	19.90			8.06	14.23
				08/15/80	+	4.79			3.86	5.08
				08/15/80	-	25.94			7.42	13.96
				08/18/80	+	6.88			3.80	8.37
				08/18/80	-	20.63			6.42	13.98
800011	Delta 88	HWFE	01/02/80	07/30/80	+	3.91			2.78	3.84
				07/30/80	-	11.68			3.10	10.59
				08/15/80	+	6.95			2.83	3.68
				08/15/80	-	12.49			4.27	10.01
800031	Delta 88	HWFE	01/10/80	07/30/80	+	6.33			3.16	7.34
				07/30/80	-	21.20			3.92	12.49
				08/18/80	+	7.16			3.21	9.66
				08/18/80	-	22.78			3.70	13.03
800050	Oldsmot ile 98	HWFE	01/16/80	07/29/80	+	7.53			12.70	11.31
				07/29/80	-	8.22			16.56	10.75
				08/11/80	+	6.80			6.19	10.45
				08/11/80	-	15.37			16.51	19.32
800060	Oldsmobile 98	HWFE	01/16/80	07/29/80	+	4.09			7.23	10.08
				07/29/80	-	8.54			15.00	11.03
				08/11/80	+	5.14			3.23	8.65
				08/11/80	-	21.76			8.25	13.66
800070	Olds Custom Cruiser Wgn	HWFE	01/23/80	07/29/80	+	12.84			12.42	10.72
				07/29/80	-	7.78			11.20	12.52
				08/11/80	+	8.31			3.09	13.56
				08/11/80	-	32.08			9.78	13.25

Results of Ames Testing from In-Use Program (Continued)

Sample Number	Test Vehicle	Test Cycle	Test Date	Analysis Date	Activation	Model Predicted Mean Specific Activity for Strain: (revertants per plate / µg extract) TA100	TA1535	TA1537	TA1538	TA98
800080	Oldsmobile 98	HWFE	01/23/80	07/29/80	+	9.66			6.61	6.58
				07/29/80	-	11.50			5.28	10.56
800140	Delta 88	HWFE	01/30/80	07/31/80	+	3.86			8.09	6.01
				07/31/80	-	7.54			5.37	6.38
800150	Oldsmobile 98	HWFE	01/30/80	07/31/80	+	14.21			12.53	7.97
				07/31/80	-	23.03			8.22	9.03
800160	Oldsmobile 98	HWFE	02/07/80	07/31/80	+	9.15			6.72	10.90
				07/31/80	-	11.03			6.45	7.08
800170	Oldsmobile 98	HWFE	02/07/80	07/31/80	+	8.12			6.44	6.47
				07/31/80	-	15.35			5.17	6.77
800190	Delta 88	HWFE	02/25/80	08/01/80	+	17.38			11.78	9.14
				08/01/80	-	18.42			14.36	12.59
800200	Oldsmobile 98	HWFE	02/14/80	08/01/80	+	17.86			6.86	7.99
				08/01/80	-	16.76			8.08	7.19
800210	Delta 88	HWFE	02/20/80	08/01/80	+	11.70			30.49	10.95
				08/01/80	-	48.95			36.90	26.31

Appendix G-4

Summary of Ranges of Preliminary Ames Data

	Test Cycle	*********** Specific Activity (revertants per plate per microgram of extract) for Strains: TA100 +	TA100 -	TA1538 +	TA1538 -	TA98 +	TA98 - ***********
No Trap (c)	LA-4	2.14 - 2.35	11.32 - 13.04	1.08 - 1.96	1.96 - 2.20	1.64 - 1.72	2.47 - 3.14
	HWFE	2.53 - 5.59	14.68 - 16.25	1.65 - 2.10	3.72 - 5.51	2.40 - 2.55	8.24 - 11.97
Uncatalyzed Trap (c)	LA-4	2.41 - 15.07	7.21 - 17.12	0.88 - 11.15	0.90 - 5.10	0.87 - 12.94	2.23 - 15.81
	HWFE	---	---	---	---	---	---
Catalyzed Trap (d)	LA-4	8.29 - 67.85	11.12 - 88.8	3.92 - 28.57	12.64 - 23.03	4.8 - 35.60	11.18 - 44.04
	HWFE	19.24 - 30.0	21.58 - 206.2(b)	27.87 - 32 39	54.79 - 132.8	7.1 - 52.34	14.0 - 31.97
No Trap (a)	LA-4	---	---	---	---	---	---
	HWFE	2.25 - 17.86	7.54 - 147.3(b)	2.31 - 54.77	3.10 - 36.90	3.10 - 15.32	5.91 - 26.31

(a) From other test programs.
(b) Questionable value.
(c) From a single vehicle.
(d) From only two vehicles.